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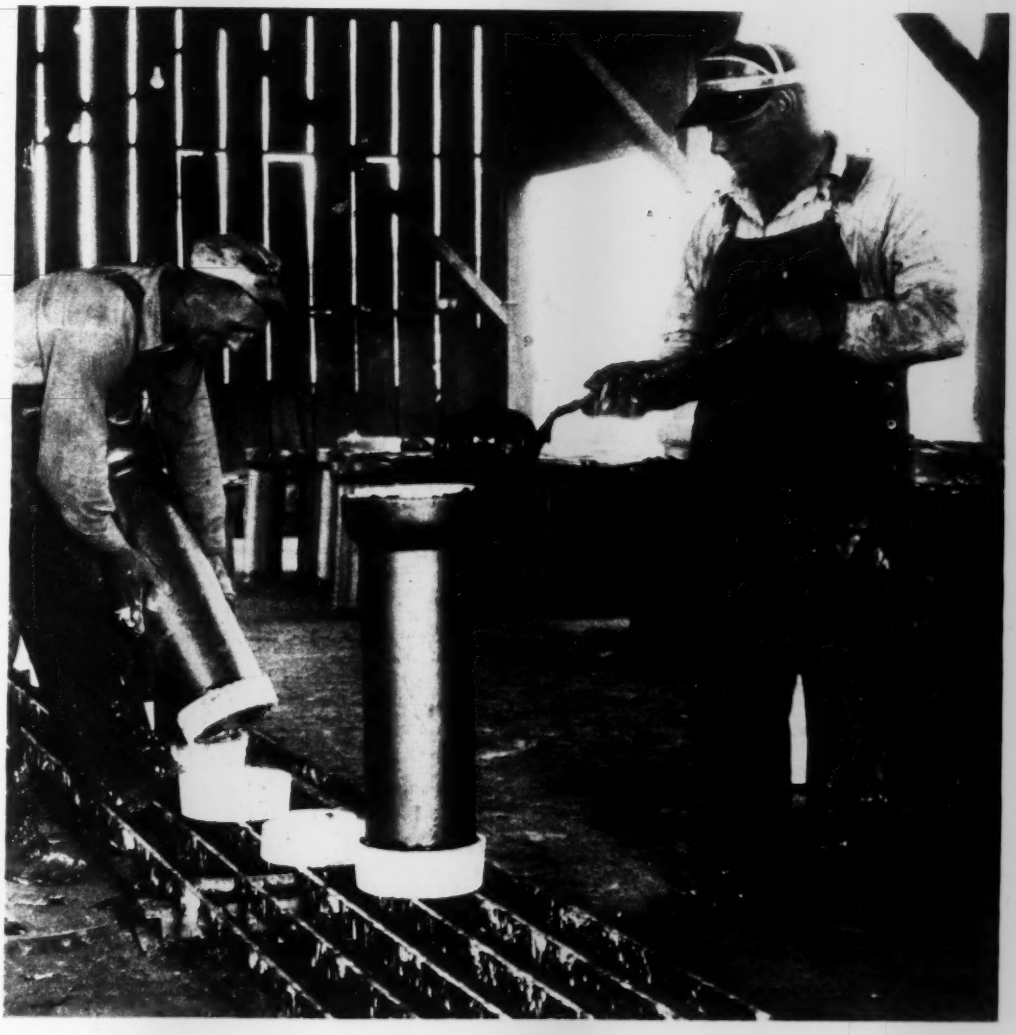

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June 11, 1931

Supporting a Steel Skyscraper on a Concrete Factory

Floodflow Experiments Vicksburg Hydraulic Laboratory

Second Article on Wind Design for Tall Buildings

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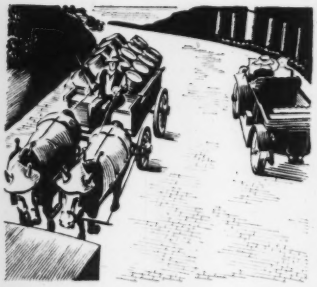

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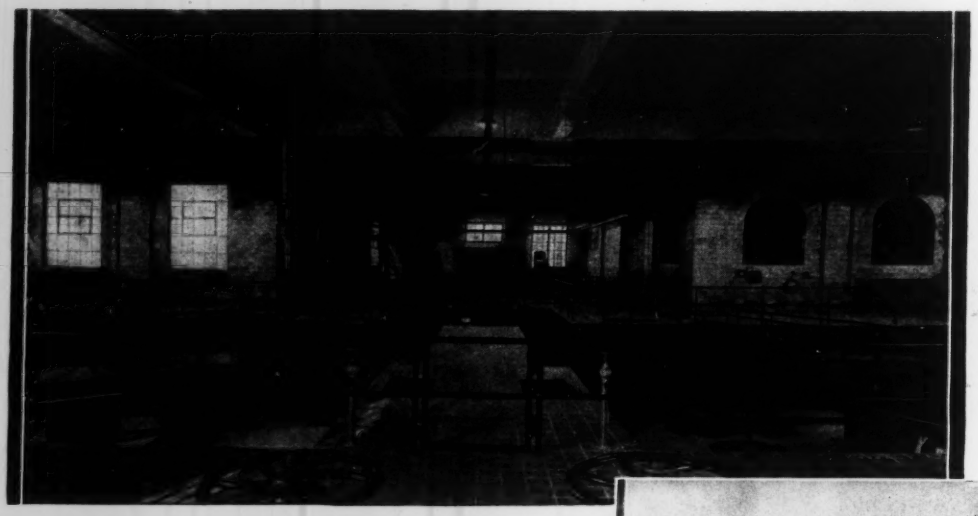
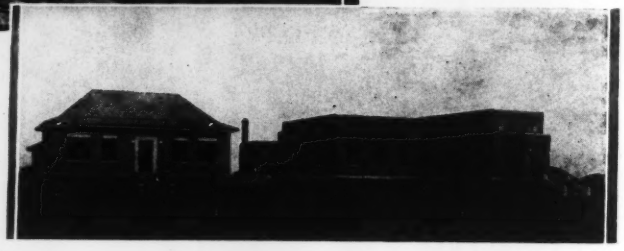


The upper view shows the attractively tiled interior of the plant at Hamilton. In the foreground are two Dorr Detritors and, in the bay in the background, are two Dorrco Screen Units. The Dorrco Bar Screen is not shown in this picture



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DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 106 NEW YORK, JUNE 11, 1931 Number 24

More Water for Athens

A MODERNIZED water-supply system for the city of Athens was put into service on June 7. The great aqueduct built by the Emperor Hadrian 1,800 years ago, although still in service, has now been supplemented by a new aqueduct and a large storage reservoir as well as by a filtration plant and service reservoir. Part of the new aqueduct is a tunnel over eight miles long, and it is this tunnel, involving as it did some of the most difficult material ever encountered in tunnel construction, that is of chief engineering interest in the new supply. Less spectacular in appearance than its famous companion, this new aqueduct will nevertheless make the modern water-supply system of Athens equally as notable as was the ancient one.

Vigorous Age

A FEW weeks ago the Verein Deutcher Ingenieure, the major technical society of Germany, reached its seventy-fifth birthday—born May 12, 1856. Today it is more vigorous, more productive, than ever in its history. Like the American Society of Civil Engineers, which celebrated its seventy-fifth anniversary two years ago, or the Institution of Civil Engineers, past a hundred, it exemplifies the growing strength of technical group thought and action. In earlier years many people believed that organizations, like human beings, tend to age and sink into senile decay—and indeed when we contemplate modern corporate organizations the specter of possible senility cannot wholly be banished from one's thoughts as a cause of future misfortune. But the societies of engineers, at least, appear to be able to resist the tooth of time. The secret of their strength no doubt lies in their vitalizing purpose. Only when that disappears need we look for the approach of the end.

Commendable Experimentation

DEFINITE justification for the waterways experiment station provided for in the act for flood control on the Mississippi River is furnished by the prompt presentation of results of the first studies undertaken. Elsewhere in this issue are summaries of experiments on flood erosion of overtopped railway track and on backwater ranges on the Illinois River with that stream and the Mississippi in flood. The experimental station has been in operation barely six months, under a newly assembled personnel and with all adjustments of organization and equipment to be made. Under these circumstances the experimental results constitute a creditable accomplishment. Moreover, the experiments completed are only two of many that have been begun. Devoted to stream hydraulics and particularly to current and flood action on alluvial streams, the waterways experiment station has a highly useful task to perform both in the work of curbing floods and maintaining channels on American rivers and for the art and science of waterways engineering throughout the world. It is gratifying therefore to witness the auspicious start that has been made in experimentation, and particularly the commendable promptness with which the results are being made known.

Frontal Attack

SURPRISINGLY extensive study is being applied to the problems of soil structure and soil manipulation in earth dam construction, as a group of articles in this issue reveals. For years the subject has been a troublesome mystery. We did not know what types of soil would make dependable water barriers, or what mixture of coarse and fine should be sought for in order to obtain tightness, consolidation and stability. The beginnings of scientific investigation to explore the mystery are relatively recent. Without discounting the brilliant accomplishments of engineering judgment and skill in prior construction it may be said that definite progress toward knowledge of measurable and predictable phenomena is hardly older than four or five years. But the present breadth of interest in the subject gives promise of significant gains soon to be recorded. The present frontal attack on the earth dam problem is of a character that will do much toward placing the art on a scientific basis.

Art and Science

WIND DESIGN of tall buildings, it has often been stated, is in many respects an art. But this very excellent phrase must be recognized as being true only within limits, for the actual design procedure itself, after the character of the wind system has been determined, is a scientific procedure, since it is precise calculation from fixed assumptions. The element of engineering artistry in wind design has one of its principal phases reflected in the problem of the Daily News Building, described in this issue. In this structure a large wind shear had to be transferred from the steel frame of the upper building downward through a six-story concrete building of flat-slab construction, to the foundations. Of the various possible solutions the designer chose one that involved carrying the wind loads around the concrete structure by spreading it horizontally to two bents of steel framing alongside the concrete building. Such a choice represents

the exercise of trained judgment based on experience and insight into structural action; mathematics or knowledge of refined design procedure did not enter. The distinction between such exercise of the engineer's art and scientific technical procedure is important to observe, for they result from different development processes. The science may be developed by mass study and professional interchange of ideas; the art is only moderately stimulated by these means, but more largely is inborn and dependent on how an active imagination utilizes broad experience. But since in the course of progress there is constant transfer of effort from the side of art to the side of science, the future of wind design may be seen to reside ultimately in the development of its science.

A Fundamental Reform

PROPOSALS for the establishment of a central mortgage reserve bank represent a first approach to a fundamental reform. Nothing of equal importance in the way of corrective ideas has seen the light since the depression began in November, 1929, but even among other projects of great scope and importance this one would still bear careful consideration. It has vital meaning to finance and business generally, and in particular to the construction industry. Such a bank, establishing a free market for realty mortgages, would introduce modern business method into a field that is now a paradise of usurious practice. It would do away with a condition under which the most substantial security in our possession is burdened with the highest interest rates and the most oppressive incumbrances of financing procedure. It would free permanently large volumes of freezable assets, and in consequence that phase of hard times phenomena which is rooted in the non-liquidity of values would largely disappear. Still further, the establishment of such a bank would, in the end, regularize construction and eliminate wildcat building practices. It would benefit principally house construction, and the importance of this field to the welfare of the construction industry group has never been shown so clearly as during the past three years. If the proposed institution can, as it promises, bring an atmosphere of soundness into the field of house building it will accomplish far more than could any possible scheme of expansible public-works programs.

A Chapter of History

HIGHWAY policy is undergoing a transformation in some parts of the country, and the extent of the change cannot yet be foreseen. It may therefore be helpful at this time to recall a struggle of the past that shows the value of a plan consistently followed. We refer to the history of Iowa, which state last year surfaced 1,400 miles of road and completed its first cross-state paved highway. Fifteen years or more ago Iowa was engaged in an interesting campaign of road improvement, through which it made a lasting contribution to the art. Its soil is deep prairie loam, and generally stone and gravel are lacking. When state road work was organized, practically all of the large mileage was narrow, ungraded dirt road, which in wet weather became boggy. To improve the roads even though materials were lacking, and to spread the limited funds over a large territory, was the object of the plan. Its essential point was permanent investment of the construction money, and simplest and most effective maintenance. The method was to provide permanent drainage, widen, grade, crown, and build bridges and culverts. The surface was left plain earth; but by dragging after every rain the roads were kept smooth and firm. All construction and maintenance followed these principles; a law that gave the state highway body extensive power over county highway planning made possible the consistent application of this policy. Under Anson Marston, chairman of the highway commission, and Thomas H. MacDonald, engineer, who fought it through against the bitter opposition of temporizers and political exploiters, it proved brilliantly successful. It remains today a classic example of the effectiveness of a wise plan consistently followed. It deserves special thought in days when the trend is toward sinking permanent road funds in short-lived "improvement"—a policy that invites early disaster for its sponsors. The work done in Iowa fifteen years ago laid a foundation for later surfacing and paving that for generations will continue to benefit its citizens.

An Obligation

THE Bureau of Contract Information, in providing an invaluable service to construction by exposing the irresponsible and unfit contractors, deserves the wholehearted support not only of some but of all interests that serve the constructor, whether they provide financial services, materials or equipment. About two years ago a group of far-sighted surety companies realized that a most effective way to discourage the awarding of contracts to irresponsibles would be to compile for engineers, architects and awarding officials a performance record of each bidder. Accordingly the bureau was organized, financed by this group of surety companies. Contrary to popular belief, it was not established for the sole benefit of themselves and awarding officials, but was opened for the use of all interests of construction. Therefore all surety companies, manufacturers and distributors of equipment, material supply dealers and banks financing construction projects have an obligation to themselves as well as to the construction industry in using and thereby building up this service.

Some of the surety companies and most of the other interests have not appreciated the true value of the bureau. They have seen in it only a means for gathering and disclosure of information concerning performances of contractors. They have not realized its functions and possibilities beyond those of an ordinary commercial credit agency; nor have they realized it is a non-profit fact-finding institution organized within and under the control of the construction industry to carry out the specific function of making construction a sounder business.

The bureau has proved its worth. It has fully demonstrated that impartial and accurate performance records can be secured from contractors. It has created an appreciation of its services among all the state highway departments, among federal, municipal and other public authorities, and among thousands of engineers and architects. It has demonstrated the value of making the past records of contractors available to those who award contracts or sell goods or services to constructors.

At present every business firm is taking every reasonable precaution to ascertain the credit standing of its clients. Manufacturers and material interests are striving for more protection through lien laws, are asking for guaranted credit through contract provisions. But

these same interests overlook the safeguard against irresponsibility and incompetency offered by the bureau in checking poor credit at its source.

The group of surety companies has carried the financial load of the bureau long enough. It is now time for all the interests concerned—manufacturers, distributors, material dealers and financial houses as well as surety companies—to realize the value of the Bureau of Contract Information to the construction world and to support it. It is an obligation they owe to themselves and to their industry.

Atlanta's Opportunity

TWENTY years ago, when the city of Atlanta began to build a sewage-disposal system, the late Rudolph Hering warned that the capacity of the three plants then being built would soon be inadequate. Since the completion of the system in 1914 no additional facilities have been provided. Meantime, the city has grown far more rapidly than had been foreseen. The increase of the population of suburban areas also has much exceeded anticipations. As a result, the old disposal plants are so overloaded that they cannot function as designed. Further, as much or more raw sewage is said to be discharged into small streams within the city as is passed through the plant. These conditions produce a nuisance and a menace, yet no steps are being taken to relieve them.

Atlanta has shown such forward-looking spirit in the provision of good water, fine streets, satisfactory waste disposal and other public services that its failure to deal with its sewage problem is an indictment of its citizens and officials. The physical difficulties are not particularly serious. Neither is the cost, for although an ultimate total of thirteen millions would be required, a considerable part of the outlay would be spread over a period of more than thirty years and the works projected are intended to serve a large area outside of Atlanta. The great difficulty seems to be an apparently total lack of leadership capable of arousing the public to the gravity of the situation. Nor has any official shown the ability to marshal the public support necessary to secure the legislation to make the undertaking possible.

It is true that the city has made a detailed topographic survey of the city and such of its environs as would have to be included in any well-conceived sewage-disposal program, and in addition has made a thorough study of the disposal problem. A report, based on this study, that contained recommendations for procedure, was rendered last fall (*ENR*, Oct. 16, 1930, p. 627). But there the matter rests. If any plans for meeting the situation have been made by local officials up to this time, the business and engineering leaders of the city are unaware of them.

But it appears that those who are affected adversely by the discharge of the sewage of nearly half a million people into streams that are at times mere trickles do not intend longer to sit idly by. Property owners along these streams near the city started damage suits some time ago. These were withdrawn by agreement to give the city time to make the necessary disposal studies. Now they again hang like the sword of Damocles over the taxpayers. State laws enacted to protect streams against pollution are available to force the city to cease discharging sewage into various watercourses, under heavy penalty. Newspapers of cities taking their water supplies from streams that have their sources within the city of Atlanta also have unofficially notified the latter that they do not intend to brook further delay. Thus a showdown is at hand. Unless Atlanta and the metropolitan area of which it is the center promptly provide adequate sewage-disposal facilities they face damage suits that may turn into judgments for high totals.

Those who have the responsibility of obtaining the legislation necessary to permit work to proceed on sewage-disposal plans should be forced by an aroused local sentiment to lose no time. The state legislature is in session; it could set up a sanitary district with a governing body selected in such a manner that its personnel would have the confidence of the public of the district. Until such confidence is established, it will be impossible to get the voters to approve the large bond issues that must be made to finance the project.

Atlanta has fearlessly and effectively overcome many great obstacles throughout in sixty years of post-war history. Only recently, following the leadership of the Atlanta *Constitution* and backed by a courageous public prosecutor, the city completely rid itself of a group of grafting city councilmen, a number of whom are serving chain-gang sentences. It is fortunate in having among its citizenship men who can force reforms in the government of the city. If these men will now turn their attention to Atlanta's sewage-disposal problem, they may achieve an equally effective cleanup.

Caution in Modernizing

MANY arguments and appeals to overcome the cautious attitude of both business men and private citizens with respect to money expenditures lack the essential element of plausibility. Since the current timidity of money arises from a powerful demand for security against loss, arguments for investment can succeed only if they are so clear and convincing as to meet every question or objection. An appeal of recent date for modernizing of old houses does not meet this test. The appeal, coming from architects, urges people to modernize their houses, saying, "There are many thousands of houses all over the country structurally sound but which were built thirty, forty or fifty years ago that could be reconstructed and modernized to advantage under existing conditions." To the man who owns a forty-year-old house such an appeal lacks plausibility. If he has already carried out some improvement work on his house he well knows that he can little afford any large modernizing expenditure "to advantage." The value of his "modernized" house is only what it will bring, and house buyers do not look with favor on revamped old houses.

Extreme changes in the living habits of our citizens have come about during the forty years, and because of them an old house is almost as little wanted as grandmother's wedding dress, and almost as little adapted to successful alteration for present-day service. Doubtless there is a great deal of modernizing and improving to be done in the dwelling-house field, but it is concerned with houses of recent date rather than with those built thirty, forty or fifty years ago. Proper counsel on modernizing houses includes a warning: Modernize; but first consult dependable real estate men and builders on values and costs, and make sure that the cost of the work will be reflected in enhanced market value. Only after this assurance has been obtained is it in order to proceed with architectural plans and a contract.

Composition of Earth Dams

Much is yet to be learned as to what materials give the best results in earth dams and how to handle them during construction—Too great dependence cannot be placed on laboratory tests of core materials

Discussion: Part I

THREE PAPERS relating to the composition of earth dams were published in our issue of Dec. 18, 1931 (pp. 954-965). They directed attention to a subject of increasing importance to the engineering profession and one concerning which too little definite information is available. The subjects of the three papers were: Core Materials at the Germantown dam, by C. H. Eiffert, chief engineer of the Miami Conservancy District; Hydraulic-Fill Core Control, by Charles E. Waddell, consulting engineer, Asheville, N. C.; and Materials in Existing Earth Dams, by E. W. Lane, research engineer, U. S. Bureau of Reclamation. This last article was the outgrowth of studies of earth-dam materials being made by the Bureau of Reclamation.

Interest in the subject continues to be active. Publication of the three papers mentioned brought out a number of other papers raising new questions and discussing some of the points previously raised. Four of them are published herewith; the others will be published at a later date. —EDITOR.

Further Study of Earth Dams and Better Terminology Needed

By J. ALBERT HOLMES
Consulting Engineer, Somerville, Mass.

DAMS of earth are among the most ancient of engineering structures. There is record of impounding embankments built 4,000 years ago, and embankments more than 2,000 years old are still in use.

Such an ancient art deserves an adequate modern terminology and method of procedure in investigation, one that can be called its own. Until now, adaptations have been in use that admittedly do not fit the conditions. An instance of this can be seen in formulas for flow through filter sands that are too limited in range to be of value in any other soil investigations. Study of earth-dam composition in recent years has progressed gratifyingly, as the symposium published in *ENR*, Dec. 18, 1930, p. 954, shows; but so far it has failed to seek out the true values of the terms of formulas. Neither has an accurate technical language been evolved. Both are either adaptations or temporary terms now too long in use. The three articles by Messrs. Eiffert, Waddell and Lane serve to sharpen the need, since they represent what attempts are being made nowadays to understand soil behavior.

Regrettable as earth-dam failures of the past have been, each failure has taught the engineering profession a lesson of value. Designers and builders have not, however, depended on such things for sources of information.

The greater magnitude and use of such structures in recent times has directed thought toward and promoted research on the problems involved. Failure by overtopping due to insufficient spillway capacity has been comparatively rare in the past and will be more rare in the future. The building of outlet and flood conduits on defective and insufficient foundations and the placing of control towers and gates at the downstream end of conduits has led to failures that better judgment and design will eliminate from new construction.

The really difficult problem of earth-dam building and the selection and handling of highly diverse materials of construction has for some years been under increasingly careful and scientific investigations and has now reached a gratifying stage of progress.

Hydraulic-Fill Core Control—The three articles under consideration are decided additions to this progress. The foreword of Mr. Waddell's article has re-emphasized the importance of uniformity. Uniformity, as defined by the late Allen Hazen, relates to that divergence in size of the particles of a material that makes for density and consequent low porosity, a condition undesirable in Mr. Hazen's filter-sand studies but highly desirable in the core of a dam and in impervious concrete mixtures.

It is important that what is taking place in the pool of a hydraulic or semi-hydraulic-fill dam be known at all times. Mr. Waddell left nothing to chance. He knew the dimensions and location of his core and its composition from start to finish.

In sampling from long pools, as at Somerset and the Bridgewater dams, the problem was investigated as to how close, in plan and elevation, samples must be taken to obtain sufficiently accurate knowledge of conditions and materials in the core. Frequency of sampling in elevation is controlled by the width of pool and rate of progress. In the early stages of construction, while the pool is wide and of large area, deposition is slow and sampling less frequent. Later, with narrowing pool and less area, the core is built up more rapidly with the same rate of borrowpit output, and sampling should be more frequent.

In using materials of varying composition and grain size, the same law applies to each material after it has reached the water of the pool. The velocity of the sluicing water with its load of earth, coming down the slopes of the outer dikes, is quickly checked, and particles of the same size or weight are deposited at the same distance from the pool's edge, regardless of the difference in number of the varying particle sizes.

If sluicing operations could be carried on at points opposite each other along the pool, continuously synchronizing in time, place and rate, there would be no tongues of coarse and fine material such as are mentioned by Mr. Eiffert and as are known to occur in other dams. In a sufficiently wide pool, tongues of coarse material do no harm, but when they reach across the pool and through the core they are exceedingly harmful. It is to detect the presence of such tongues and to correct the condition that samples are taken or tests made at more frequent intervals across the pool and core, and still more

frequently in distance and time in a narrow than in a wide pool. The sluicing specifications for a hydraulic-fill dam should be explicit as to relation of dikes to each other. Relation of dikes to center of core and to rate and amount of sluicing from opposite dikes should likewise be explicit. The importance of plotting the record obtained by sampling is that it shows exactly the core's location, extent and its relation to the remainder of the structure.

As to longitudinal spacing of cross-sections on which samples are taken, it was found at Somerset dam in 1912, by taking samples on numerous cross-sections, that sluicing from dikes equidistant from the desired center line and parallel to each other and to core center line resulted in deposition of material that was uniform. That is, it was found that from shore line outward there was regular gradation of sizes along the pool and that samples taken at sections a considerable distance apart could be relied upon to give sufficiently comprehensive data. Somerset dam has a crest length of 2,100 ft. and samples were taken on sections 300 ft. apart. The Bridgewater (N.C.) dams are 1,300 to 3,000 ft. long, and the sampling sections were mainly spaced 200 and 300 ft. apart.

From the seventeen sections at Bridgewater more than 2,000 samples were taken and mechanical analyses made.

Several methods of separating and measuring the finer particle sizes in soils are in use. The very fine particles (colloidal size) are associated with the smaller sizes of a soil. To segregate and measure these particles, both elutriation and centrifuging are resorted to. Allen Hazen, in his experiments with filter sands (1892), employed elutriation for separating sizes below 0.10 mm. diameter. For his 15-sec. settlement period he assigned a diameter of 0.08 mm., and for the 60-sec. period a diameter of 0.04 mm. These sizes were determined by micrometer microscope measurements of three diameters and reduction to the mean diameter.

The federal government, in its bureaus dealing with soils, uses the centrifuge, operated at known speeds and forces of gravity. The sizes thrown down under the various speeds are established by micrometer microscope measurements. Another method is the measurement of densities of soil solutions by hydrometer, calibrated in terms of grams of suspended material. Results by this method do not agree entirely with standard curves but may be used when the error is known. At the Bee Tree dam Mr. Waddell used both elutriation and centrifuging. Chemicals, mainly ammonia assisted by agitation, are used to disperse the particles in all the above methods.

Valuable Results From Miami Studies

Core Examination—The comprehensive examination of the core of a seven-year-old Miami Conservancy dam has furnished a welcome addition to earth-dam core data. The assurance that results obtained from a 5-in. drill hole were fully comparable with those from a 5-ft. shaft was not the least valuable result of the investigation. Because of this favorable result, at a lesser cost and with less time consumed, we may expect explorations to be made of other dam cores and the acquisition of other valuable data leading to the solution of important problems.

The writer does not consider it at all unfortunate that tongues of gravel reach into the fine material of the core. Such a condition has not been and can not now be avoided under the methods of placing necessarily employed.

Moreover, it is not desirable that the core of a dam dry out, even to the extent of suggested shrinkage and cracking. On one occasion during construction of these dams, when a pool was drained for some time, core material did dry out, shrink and develop surface cracks, and had to be especially treated before sluicing was resumed. In the case of the Miami dams, standing as they do for long periods without water against them, shrinkage of the core would be especially unfortunate. The gravel tongues, sloping toward the core, form reservoirs supplying the core with moisture. From the favorable condition in which the core was found upon examination, 25 per cent moisture is not an excessive amount. The probabilities are that this amount will be reduced by further settlement and reduction of voids.

Two Investigations Under Way

Correlating Data—The United States Bureau of Reclamation has inaugurated two lines of investigation, in both of which the engineering profession has been asked to cooperate. One is "Percolation Through Earth Dams," and the other "Mechanical Composition of Earth Dam Materials." The writer has for some time been in possession of a progress report on the second subject and is pleased to see these valuable data now published for wider distribution. It is of paramount interest to engineers that these studies continue as rapidly as is consistent with sound judgment. To correlate data, it would now seem opportune to standardize, at least tentatively, the methods and procedure of obtaining information. In the study of percolation through earth dams the Bureau of Reclamation has outlined a course of procedure. As regards materials, it does not matter particularly how a mechanical analysis is made, so long as uniformity of determining size of particles is followed. Important as mechanical analysis now seems to be in the solution of earth-dam problems, it does not furnish sufficient information, as pointed out by Mr. Lane. Most of the methods of presenting the results of mechanical analysis are far from desirable, and some of them are unintelligible. Without doubt all the workers in this field of investigation would be glad to have and use a uniform method of displaying analysis, a form or chart on which accepted classification of sizes and divisions are shown.

As an index, the term "effective size" is used by many in connection with dam materials. The term "uniformity coefficient," also used, is unfortunately a misnomer and means non-uniformity and not uniformity. Non-uniformity is a condition important in dam materials, but the time has arrived to determine whether or not these terms apply in the same manner to the fine materials of earth-dam cores as they do to filter sands, for which they were derived. Hazen warned repeatedly, that they did not. He said, referring to the Lawrence, Mass., experiments and sands used therein: "The data at hand justify the application of this formula to sands having a uniformity coefficient below 5 and effective size of grain 0.10 to 3.0 mm." In the core materials we work with, uniformity coefficients well above 5 and effective sizes far below 0.10 mm. occur. The observed flow in the Bridgewater experiments was about one-fourth the rate computed by the formula derived from the Lawrence experiments. Investigations are now under way that indicate a like reduction in another of the factors of the Hazen formula, and it has recently been demonstrated that the effective size of some sands is not at the 10 per cent point, but higher. These remarks are not in criticism but are made to point out the necessity of further investigation.

The retention of fines in the core pool of the Somerset dam and the use of alum to precipitate the very fine material remaining long in suspension are mentioned by Mr. Lane. Not all the fines were retained. Before introducing alum into the sluicing water and placing it in the pool, it was estimated that approximately 100 cu.yd. per 24 hours escaped with the overflow from the pool. The use of alum reduced this amount about 50 per cent. When, during the second and last construction season, no alum was used, the pool overflowed part of the time. The writer ascribes the successful use of very fine core material in the Somerset dam to the heavy and stable materials of the outer dikes. In addition to the smaller rock in the borrowpits, boulders too large to load were blasted and sent to the fill.

An interesting and important development in method was the construction of Henshaw dam by a combination of rolled fill and sluicing, the outer dikes placed by wagons and compacted by travel of wagons and mules. The core was a straight hydraulic fill. The method was deliberately planned for rapid construction within the limits of a short season. In a more recent rolled-fill dam of considerable height the material was placed by trucks at a unit price close to semi-hydraulic prices.

It is being found that settlement of rolled-fill dams, as ordinarily built, considerably exceeds that of hydraulic fills.

Voids are closely related to seepage and might well be studied in connection with core materials. In making mechanical analyses, the rejection of sizes above a certain diameter changes the seepage rate of the sample; that is, the seepage rate with the larger sizes out is not the same as when they remain in the sample. The larger sizes are omitted for convenience in making the analysis. However, the practice is not uniform as to size and diameter at the point of rejection, below which the sample is considered as 100 per cent.

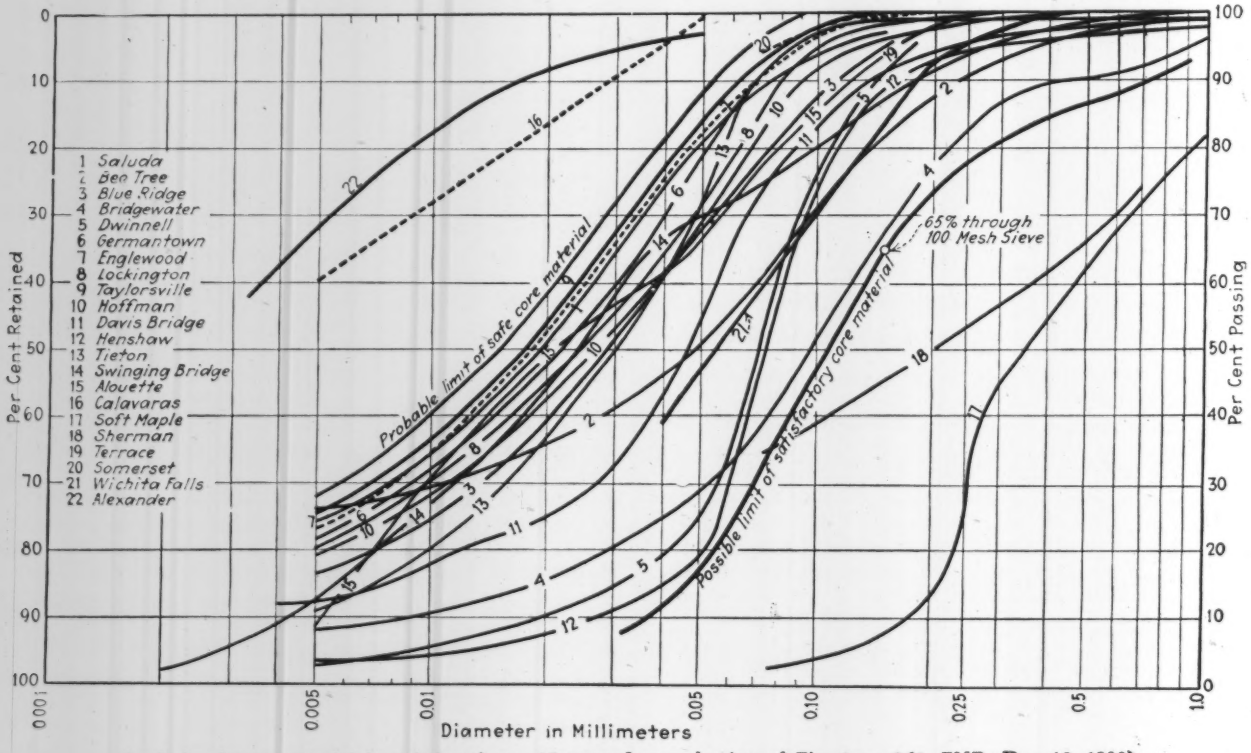
Materials in Existing Earth Dams

By E. W. LANE
Research Engineer, Bureau of Reclamation, Denver, Colo.

IN THE CHART (Fig. 3) that accompanied my discussion of materials in existing earth dams, published as part of the symposium on the composition of earth dams (*ENR*, Dec. 18, 1930, p. 961), an error was made in plotting the line representing the core material of the Wichita Falls dam. The same chart, except for this change, is reproduced herewith. Referring to this revised chart, the first two paragraphs of my statement concerning hydraulic-fill core material should read as follows:

"Considerable data were secured on the composition of the core material of hydraulic-fill and semi-hydraulic-fill dams. In Fig. 3 the analyses are shown graphically. The materials of successful dams vary over a wide range, the finest showing 50 per cent coarser than 0.0175 mm. and the coarsest 50 per cent larger than 0.34 mm., or a ratio of size of 1:20.

"It is not possible to determine with exactness the lower limit of size for safe core material. The line on Fig. 3 labeled 'Possible Limit of Safe Core Materials' is somewhat arbitrarily placed roughly parallel to and indicating particles slightly smaller than those of the Taylorsville dam core (No. 9). Although a dam might safely be built with finer core material than indicated by the line—especially if the rate of progress were slow—in view of the failure of the two dams with fine core material, for ordinary progress rates, material finer than the limit indicated would hardly be conservative practice unless tests of the rate of consolidation were especially satisfactory."



Analysis of core material in existing dams. (Corrected reproduction of Fig. 3, p. 965, *ENR*, Dec. 18, 1930)

Laboratory Tests Can Never Supplant Sound Judgment

By O. N. FLOYD
Floyd & Lockridge, Consulting Engineers, Dallas, Tex.

GENERALLY, between rather wide limits, the nature and grading of the material available for the construction of an earth dam is not so important as it is to know just what is available and how best to handle it. Mr. Lane, in his article on the materials in existing earth dams (*ENR*, Dec. 18, 1930, p. 961), has presented a very clear and definite picture of the materials in a number of earth dams already built that are giving various degrees of service.

These results should prove a valuable guide in examining the materials for a prospective dam, provided the equipment and methods for making such analyses can be made reasonably simple. In this connection, however, it is important to bear in mind that it is often difficult and expensive to obtain samples of a borrow pit that will truly represent the mixture finally to be placed in any or all sections of the dam. Proper sampling of the borrow pit becomes very important if there is much variation in the material in both the vertical and the horizontal directions, as is often the case.

Possible Changes in Types

Rolled-Fill Dams—With the greatly increased capacity and dependability of crawler-tread tractors and dump wagons there has been a great reduction in the cost and construction time of rolled-fill dams. Many large dams formerly built by the hydraulic or semi-hydraulic process, because of the greater speed and economy of these methods, could now be built as rolled-fill dams with modern equipment just as quickly as by any other method, and where suitable material for a rolled-fill dam is available the cost would likely be in favor of the rolled fill.

The ideal for this type of dam is, of course, to have material for the outer slopes that will readily drain, and while wet be stable on reasonably economical slopes, and to have an impervious clay for the core or middle third. In many localities no such combination of material is available or else can be had only at a prohibitive cost, in which case the studies being made by Mr. Lane should prove even more helpful than for the hydraulic fill. If coarse material is not available for the downstream third of a rolled-fill dam and the core is not likely to be entirely impervious, the treatment of the downstream slope and toe becomes very important.

It is likely that the limit line of satisfactory core material fixed by Mr. Lane in Fig. 3 is too coarse in the lower third to avoid seepage, which would prove unsightly unless the downstream slope was of material that would readily drain.

The writer has found that certain types of clay soils that allow water to seep through rather freely in their natural beds or in an embankment placed dry will make an impervious core when puddled or placed in water. This is especially true of some of the soils in Texas and the southwest. A puddled core in a rolled-fill dam will also remain plastic and adjust itself without cracking to any settlement of the rolled fill or the underlying earth after the reservoir has filled. Such a core will not dry out and crack, should the water in the reservoir be drawn down and remain low over long periods of drought. The rapid filling of the reservoir after having been low or empty for a long time has caused the destruction of a few rolled-fill dams with sprinkled and rolled cores.

Hydraulic Fill Dams—Probably no other method of earth-dam construction is capable of producing a satisfactory dam from so wide a variety of borrowpit materials as is the hydraulic method. The borrowpit materials from which the five dams of the Miami Conservancy District were built showed far greater differences than would be suspected from reading Mr. Eiffert's article or most of the former articles and reports on these dams. The material at all of the dams was of glacial origin and contained considerable sand and gravel, and a lot of the material that would pass a 100-mesh sieve appeared under the microscope to be fine sand. Huffman, Englewood and Germantown were constructed largely from a rather clean sand and gravel lying below the flood plane of the rivers. This material was generally overlaid by a few feet of top soil and silt suitable for the core.

At the Huffman and Germantown dams the gravel was so clean and the top soil so shallow that it became necessary to sluice additional clay from the hills to keep the core pool filled so that the sand and gravel along the edge of the pool would not slide into the core. At the Englewood dam one dragline along the edge of the valley could reach clay as needed; but the idea prevailed there at first that excess clay might cause trouble, and considerable sand and gravel slipped into the core before the deficiency of core material was corrected.

The Taylorsville and Lockington dams were constructed by sluicing the material from the hills to sumps, from which it was pumped to the dams. The pit material at the Taylorsville dam was about 50 per cent sand and gravel, and the rest was clay with some very fine sand. All voids were filled with clay, and an impervious rolled fill could have been made from this borrowpit without any particular selecting or sorting. The material at the Lockington dam was somewhat similar to that at Taylorsville except that the amount of clay was much less.

The analysis of core material (Fig. 3) in Mr. Eiffert's article shows the analyses of all these cores to be very similar and the cores of Taylorsville and Englewood to be nearest alike, although about half the clay pumped into the Taylorsville core was wasted and no more clay was pumped into the Englewood core than was necessary to keep it fairly well filled with mud.

Excess Fines May Be Wasted

Usually it is easy to waste any amount of fine core material by the hydraulic method so as to leave a satisfactory core and a safe dam, but such a process may be too expensive if the percentage of material suitable for the slopes is too small.

Where the clay comes largely from the voids in the sand and gravel, as it did at Taylorsville, it is not very expensive to waste core material. Computations from adequate cross-sections showed the hydraulic embankment at Taylorsville to be 85 per cent of the borrowpit measurement, and a large part of this loss occurred during the placing of the last 15 ft. at the top where practically all the core material and some sand went out with the return water.

Mr. Waddell is to be commended for doing whatever

is possible to eliminate the personal equation from methods of testing cores as the work progresses; but methods capable of giving dependable and immediate results, so that the formation of the core can be guided and protected properly as the work proceeds hour by hour and day and night, will doubtless always remain more of an art than a science. The writer does not recall from an experience with eight large hydraulic-fill dams any unsatisfactory condition of core that could not be detected definitely and immediately by a 6-in. cast-iron ball and a round wooden pole in the hands of a reasonably intelligent inspector who has had a few days of close supervision by one experienced in this line of work.

Sand strata, if present, can be detected and located readily with the pole; and if the cast-iron ball sinks less than 2 ft. below the surface of the mud when let down into it slowly, it is time to examine the core by more exact methods, such as described by Mr. Waddell or used by Mr. Lane, so as to determine if it is suitable to be left in place.

Generally, if the ball sinks more than 12 to 15 ft. below the water surface in the pool, some sliding of the coarse material along the shore into the core should be expected. If the dam is low and the core pool wide, such slides will do no particular harm; but if the dam is well up, the gravel slides take a very flat slope as they reach the stiffer core material deeper down and may extend across the core.

The writer has never used anything more than a standard set of sand sieves with the 200-mesh sieve added to test out questionable spots found with the ball and pole, but he has felt that these were inadequate, largely because it is difficult to determine how much the material has been altered in the process of getting it ready for and through the sieves. Some such methods as those used by Mr. Lane or Mr. Waddell should prove much more satisfactory for this work.

Lake Kemp and Garza Dams

The Lake Kemp dam near Wichita Falls is 100 ft. high and was built with a 20-in. dredge in nine months. (*ENR*, June 21, 1923, p. 1,080 and Dec. 20, 1923, p. 1,004.) The borrowpit material in the valley above the dam was a sand generally too fine for a good concrete sand and contained about 25 per cent of silt and top soil. Until the dam was within about 20 ft. of the top the material and the balance between the fine and coarse material appeared to be about ideal, but from that point on up the core pool became so narrow and the dredge delivered such a large volume of water (about 30 to 35 sec.-ft.), that it became difficult to keep enough clay in the core to make it impervious.

The Garza dam near Dallas, Tex., (*ENR*, April 16, 1925, p. 630, and March 17, 1928, p. 772), was built with a 24-in. dredge, and on the south end where the borrowpit material was largely a very fine sand it was almost impossible to get a proper core near the top, so that much of it had to be dug out and replaced with suitable material. Our rule was to require the material in the core to be dug out and replaced where less than 35 per cent passed a 200-mesh sieve. This reservoir was filled with water in 1927, and about 1,000 ft. of the dam near the top, where the core had given the most trouble, seeped quite badly, so much so that tile was laid in the downstream slope at a few of the worst places. In less than a year, however, all seepage had stopped although no muddy water has reached this dam to date. It is doubtful if the margin of safety against seepage at this point was as much as good practice would demand while the embankment was new, and under no circumstances should so large a dredge be used to top out with this sort of material.

Mr. Eiffert has performed a very distinct service in undertaking the investigation of the core of the Germantown dam and making the results of these studies available to the profession. These results seem to confirm the early conclusions reached by a few of us who made a very thorough study of the materials for these dams before construction started. In working out the probable construction programs much study was given to the best width of core and to the advisability of limiting the rate at which the hydraulic fills should be brought up. The writer, however, reached the conclusion early in his studies of hydraulic-fill dams and the materials for their construction that within the limits of practicable construction methods the rate of vertical progress has little effect on the consolidation of the core. If enough core material is available, a core of proper density can always be obtained by crowding enough material into the core and allowing those particles too light to precipitate readily to be washed out with the waste water.

When a core material weighing 110 lb. per cu.ft. or more is obtained, it will be heavy and stable enough to keep sand and gravel from sliding if the side slopes of the core are about $\frac{1}{2}$ to 1. By its own weight the surplus water will be forced out and up, and whatever consolidation it gains within any reasonable time will be due to its composition and the weight of the material above, and not due appreciably to any elapsed time. This point is discussed more at length by the writer in *Transactions*, Am.Soc.C.E., Vol. LXXXV, p. 1,217.

The writer does not altogether agree with Mr. Lane that to waste core material necessarily causes the core to become narrower, unless he had in mind that a few hydraulic-fill cores have been widened out to unsafe widths so as to try to keep all the clay in the dam.

While Mr. Lane's statement—that wasting core material causes the remaining core to be coarser—is literally true, the difference is of little consequence so long as the core pool has a water cross-section sufficient to prevent velocities of more than about 1 ft. per second. Unless the water is carrying a very large amount of suspended clay or colloidal matter, material too coarse for a satisfactory core will not be carried very far from the shore line of the pool with velocities less than 1 ft. per second.

Laboratory Tests Do Not Tell All

That laboratory analyses of materials for earth dams may not tell the whole story of their behavior in the dam during construction and later is one of the questions raised by Mr. Lane. The writer is decidedly of the opinion that they will not. The shape and specific gravity of even the very fine particles are probably important factors in the formation and consolidation of hydraulic-fill cores. The Wichita Falls dam was built up at the rate of about 12 ft. per month for seven consecutive months with a very fine core material, but it settled out of the water and consolidated rapidly and was a very heavy core. It weighed from 130 to 135 lb. per cu.ft. when first removed, and a 6-in. cube cut from a larger block that had dried in the open air for a few months weighed at the rate of 140 lb. per cu.ft. The rapid consolidation of this core, however, was not

altogether a fortunate accident. If it did not consolidate and offer proper resistance to the cast-iron ball, the dredge was moved to the edge of the valley where there was more clay, and tons of soupy light-weight material were crowded out with the return water, so much so that the lower part of the reservoir was filled with it and it got into the pit where the dredge was working, making it necessary to move the dredge to higher ground and start a new pit. This mixture, including the water, weighed only about 70 to 75 lb. per cu.ft. and seemed to stay in suspension at the bottom of the reservoir for weeks.

Laboratory analyses and tests of materials for earth dams should increase in value as they are extended and the results are tested in practice, but their limitations should not be overlooked. Food products have been largely standardized and most of their properties are well known, but extensive laboratory investigations have failed to relieve the need for good judgment and personal experience in their final preparation. And so in the more uncertain field of dams built of and upon earth and rock, with their multitudinous gradings and combinations, no amount of knowledge gained through the laboratory will ever relieve the need for experience and good judgment or greatly reduce the damage that can be done by the bold and the unsuspecting who enter this field without the guidance of proper experience.

* * *

Gradation of Materials in Earth Dams an Important Factor

By CHAS. H. PAUL
Consulting Engineer, Dayton, Ohio

IN THE DESIGN of hydraulic-fill dams it seems fairly well established that the side slopes of the core section should be steep in order to prevent the shoulder material from sloughing into the core. In the Miami Conservancy dams the core sections were designed with side slopes of one-half to one, and this design has been followed in several other hydraulic-fill dams with satisfactory results. It is believed that with ordinarily satisfactory material a core section with side slopes as steep as one-half to one will be satisfactory against sloughing-in of shoulder material, and thus one difficulty of hydraulic-fill dam construction may be removed.

As to size and gradation of suitable core materials, considerable leeway seems to be permissible, and satisfactory cores have been built from materials quite different as to both size and gradation. It is generally agreed that at least a large percentage of the core materials should be fine enough to pass the 100-mesh sieve. The writer favors a material nearly all of which passes 100 mesh and a large percentage of which will pass the 200 mesh. A satisfactory grading below that size (about 0.1 mm.) is of great importance, with some extremely fine particles as small as 0.005 mm. or smaller. It seems obvious, on the other hand, that a preponderance of the extremely fine particles is liable to cause trouble, and experience has borne this out. The core material in the Miami Conservancy dams contained 20 to 25 per cent of material finer than 0.005 mm. and was fairly well graded up to the 0.1 mm. size, which corresponds approximately with the size of opening in the 200-mesh sieve. Generally speaking, only a small percentage was coarser than the 0.1 mm. size. This material consolidated fast enough to answer all practicable requirements and formed a tough impervious mass, which, during construction and afterwards, had every evidence of making a thoroughly satisfactory core. There are cases on record where somewhat coarser material than this has been used satisfactorily, and no doubt a somewhat finer material could be so used, provided it was well graded and was not too slow in consolidating. It should be remembered that the mechanical analyses of this core material at any dam are likely to vary greatly from day to day, and only rough approximations to fixed standards should be expected.

Mr. Eiffert's examination of the seven-year-old core of the Germantown dam furnishes valuable information. In the first place it gave an opportunity to get right down into the core and examine it in place. Samples were secured from the undisturbed material, and many questions on which differences of opinion had existed were settled once and for all. The core was tough and stable, though moist and somewhat plastic. Its moisture content had not changed appreciably since construction was completed. It was as nearly impervious as could be expected and fully satisfied all reasonable requirements as to watertightness. Its weight of 125 lb. per cu.ft. was additional evidence of its compactness. These investigations seem to show also that samples carefully obtained by ordinary well-drill methods are fairly representative of the material in place. This alone is a valuable contribution, as it makes possible the sampling of core materials by a standard inexpensive method, with the assurance that the samples, so obtained, are reliable.

Dangers Involved—It has often been said that the greatest dangers to a hydraulic-fill dam are present during the construction period. It might be better to say that hydraulic-fill methods involve certain dangers that are not encountered in other types of earthfill construction. One of these dangers is that of the shoulder material sloughing into the core, thus allowing the unconsolidated core material to work its way toward the outer slope and perhaps to break through, as has happened in one or two instances. This may be obviated by so designing the core that the side slopes will be steep and by proper selection of the shoulder material. The danger of sand tongues extending out into the core has long been recognized, and this is carefully guarded against on any well-managed hydraulic-fill job. No pains should be spared to be safe on that point. A reasonably wide core section, carefully and constantly inspected, is the best insurance against that menace. Another danger is that of maintaining the core pool as construction proceeds. The matter of bringing up this pool on top of the work as the dam is built higher and higher is not simple, and many of the so-called breaks during the construction of hydraulic-fill dams have been due to the water in the core pool overtopping or breaking through the confining levees on either slope of the dam. When this happens and the water once gets away, it is sure to damage the work; and while it may not affect the integrity of the structure, it does cause expense and delay as well as uneasiness in the minds of the public. In many cases where that has happened, however, most of the damage has been due to a washing out of slope material and not to loss of the core itself. There are many cases on

record where a washout of this kind has revealed a thoroughly stable and well-consolidated core that has remained in place in spite of the removal of support from the shoulders. Since experience has shown how frequently such accidents have happened, all the more care should be exercised in maintaining the core pools.

Selection of Material—In selecting borrowpits for a hydraulic-fill dam, there is usually an advantage in having some excess of core material, which permits an easy method of core control by wasting more or less fines as occasion requires. This wasting of fines often is done more for the purpose of controlling the dimensions of the core than to control the character or gradation of materials. Cases arise occasionally where for one reason or another the wasting of fines is not permissible, as for example when the turbidity of the river below the work must not be increased. Then the control of the core is much more difficult, and the borrowpits must be selected with still greater care.

In the writer's opinion the availability of suitable coarse stable material for the outer slopes for hydraulic-fill construction is fully as important as the assurance of suitable core material in quantities required. The stability of the whole structure often depends on adequate shoulders of stable free-draining material, and by no means should this requirement be neglected. The best core in the world is no good without stable shoulders to support it.

As a matter of fact, in any earthfill dam this requirement of coarse stable free-draining material for the outer slopes is one that should not be overlooked. Many difficulties in rolled-fill dams and dikes have been caused by the use of too much of the fine and relatively impervious material, and too little of the coarse stable free-draining material to back it up. Under full head for long periods of time even the most carefully selected so-called impervious materials will permit some seepage. The basic theory of earth-dam design should not be forgotten, namely, to have approximately impervious material in the upstream section, gradually changing to more and more pervious material toward the downstream slope. Other considerations, such as protection against wave wash and prevention of sloughing, usually require some modification of, or addition to, this theoretical section at the upstream face; but so far as the downstream section is concerned, nothing contributes so much to safety and security as plenty of coarse stable free-draining material.

Station Platforms of Precast Concrete

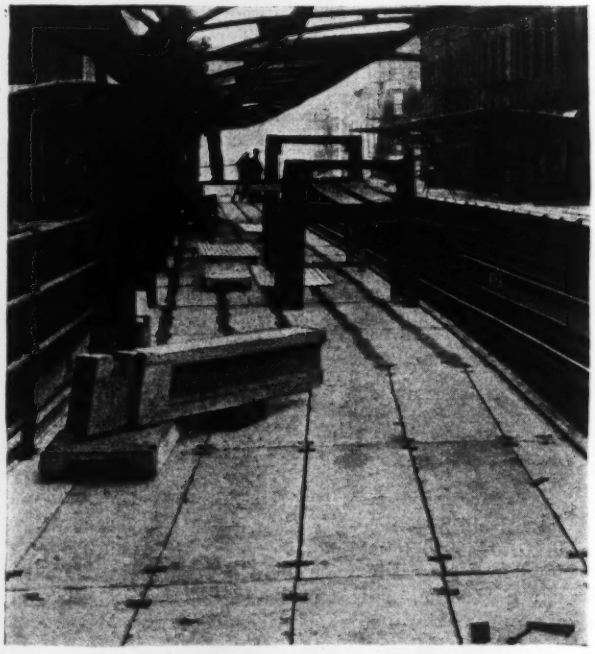
A NEW TYPE of floor or paving used for the platforms and passageways of the Kinzie St. station of the Chicago elevated railways consists of precast concrete slabs bolted to the steel framing and covered with asphaltic filler and a wearing surface of asphalt planks. This design was adopted on account of its light weight, permanence and low cost of construction and maintenance. The weight is 25 lb. per square foot for the slabs, and 30 lb. including the filler or base course and the planks. These platforms are designed for a 100-lb. live load.

The concrete slabs are 8 ft. long and 19 in. wide, tapered slabs being inserted to fit a curve in the platform. Those of the outer rows have a curb to retain a bituminous base on which the asphalt planks are laid in hot mastic. Bolts engage washers or clips under the steel framing. In the accompanying view the slabs are shown in place, those in the background having the joints sealed preliminary to laying the base course. Precast concrete flat slabs used for the stairs are fastened by flat-headed screws engaging threaded clips behind the steel. Tread slabs have a carborundum finish to form a wear-resisting and non-slip surface.

It was intended originally to lay sheet asphalt on the concrete, but the engineer states that as this would cost much more than the asphalt plank and there was some doubt as to its wearing qualities and the possibility of cracking, it was decided to use the asphalt plank, which is made under pressure and has been found to have excellent wearing qualities. The floor of light precast concrete slabs is expected to be as permanent as concrete poured in place, while the former has advantages in lower cost and dead weight and the fact that it can be laid at any time of the year. On this particular job the asphaltic base was necessary to give the surface a proper pitch for drainage, but for future work the concrete slabs would be designed to give the necessary pitch.

In using this type of platform, one object was to obtain a waterproof floor which will protect the steelwork, so that the upper surfaces will never need painting after the work is completed. This construction will also greatly reduce the cost of maintenance experienced with wood flooring and the serious rusting of steel members due to inaccessibility for cleaning and repairing.

For the work described the concrete slabs were made by the Federal-American Cement Tile Co. and the asphalt planks by the Luce-Stevenson Co. Both the design and construction of the station were under the direction of C. M. Mock, special engineer of the Chicago Rapid Transit Co.



Precast slabs form station platform

Some of the channel-shaped slabs are shown. Asphalt planks are used for the wearing surface.

Supporting a Steel Skyscraper on a Concrete Factory

Difficult wind-design problem in Daily News Building in New York solved by a horizontal truss carrying wind shear around bottom six stories of flat-slab concrete construction

IN DESIGNING the Daily News Building in New York City it was necessary to superimpose a 30-story structural-steel frame on six stories of reinforced-concrete flat-slab construction. The structural problems, particularly those caused by the necessity of carrying the wind from the upper part of the tower through the reinforced-concrete construction, were unusually complicated. An ingenious solution involving a horizontal truss in the plane of the seventh floor was worked out, so that the wind shear brought down to the level of this truss is carried around the reinforced-concrete portion of the building.

Several other details of structural interest are presented by this building. A wide spacing of columns (approximately 30 ft.) is utilized to improve and increase the net rentable area. Double girders straddling the columns are used in the wind bents. In the lower stories built-up steel columns are utilized where the magnitude of the loads required sizes beyond the range of the rolled H-sections available. A special framing was required around a circular entrance lobby, in which is housed an extensive collection of geographical and meteorological exhibits, including a 12-ft. diameter globe made up of two aluminum castings mounted on an inclined shaft in a sunken pit in the center of the floor. The globe makes a complete revolution every 10 min.

Fig. 2—The Daily News Building, New York
The plant portion appears as the low building at the right. Six stories of its flat-slab reinforced-concrete construction extend beneath the rear half of the office building.

The Daily News Building is L-shaped in plan, made up of a ten-story printing-press building (six stories of reinforced concrete and four of structural steel) as one leg of the L and a 36-story steel-frame office building as the other leg. Therefore, at the corner, where the two legs overlap, the lower six floors are of reinforced-concrete construction and the upper 30 floors are of structural steel. This overlapping portion is approximately 94 ft. square. To the north of it the 36-story steel frame is 100x94 ft. in plan, and to the east the factory portion is 94x232 ft. The factory is designed to permit adding five additional structural-steel stories. The total height of the building is approximately 430 ft.

In principle, therefore, the Daily News Building is made up of two separate buildings involving two different types of construction with radically different structural designs. It was decided to divide the design work into two distinct and separate parts. The concrete work was handled by Lockwood Greene Engineers, Inc., specialists in industrial-plant design, while the structural-steel design was developed by Weiskopf & Pickworth, consulting engineers, New York City. In the corner area, where the two types of construction overlapped, Weiskopf & Pickworth designed from the roof down to the seventh floor, while Lockwood Greene handled the problems of the first six floors. It is in the design of the steel frame that the principal interest lies, inasmuch as this was the part that had to be accommodated to the factory building and is superimposed upon it.

Wind Design—In plan, the steel-frame office building is 194 ft. long north and south and 100 ft. wide east and west, reducing to a width of 62 ft. above the eleventh floor in the section over the printing-plant area. Only in an east-west direction, therefore, was wind a con-

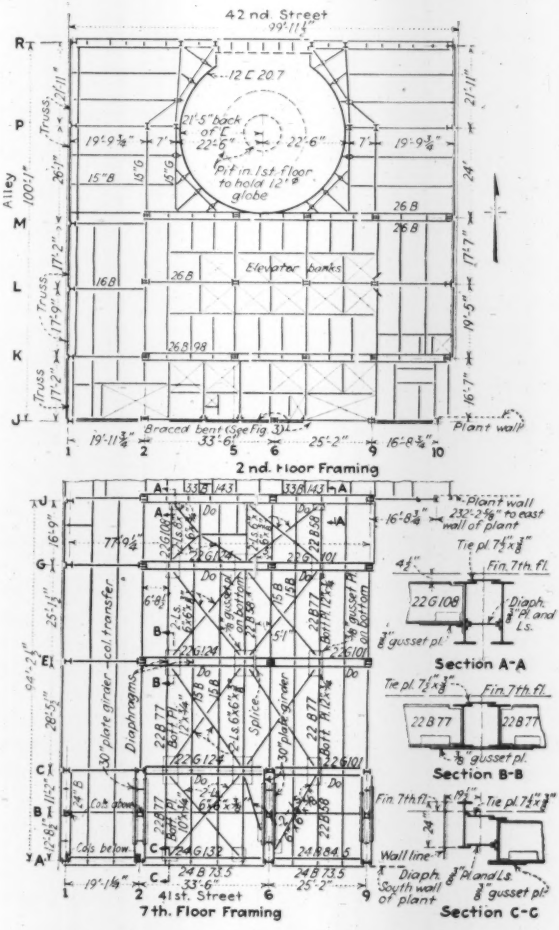
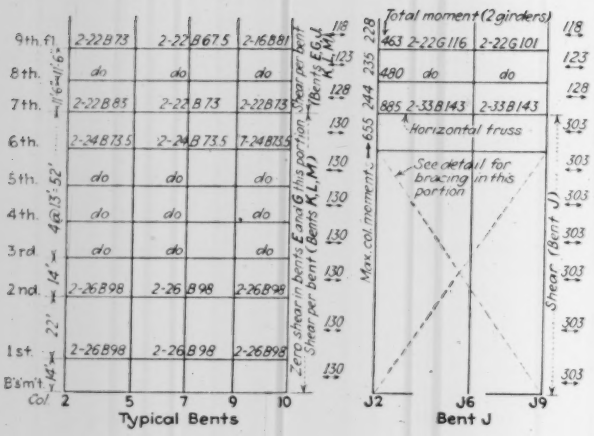


Fig. 1—Typical floor plans, Daily News Building
Note circular lobby in second-floor framing and horizontal truss in plane of seventh floor to carry wind shear around factory.



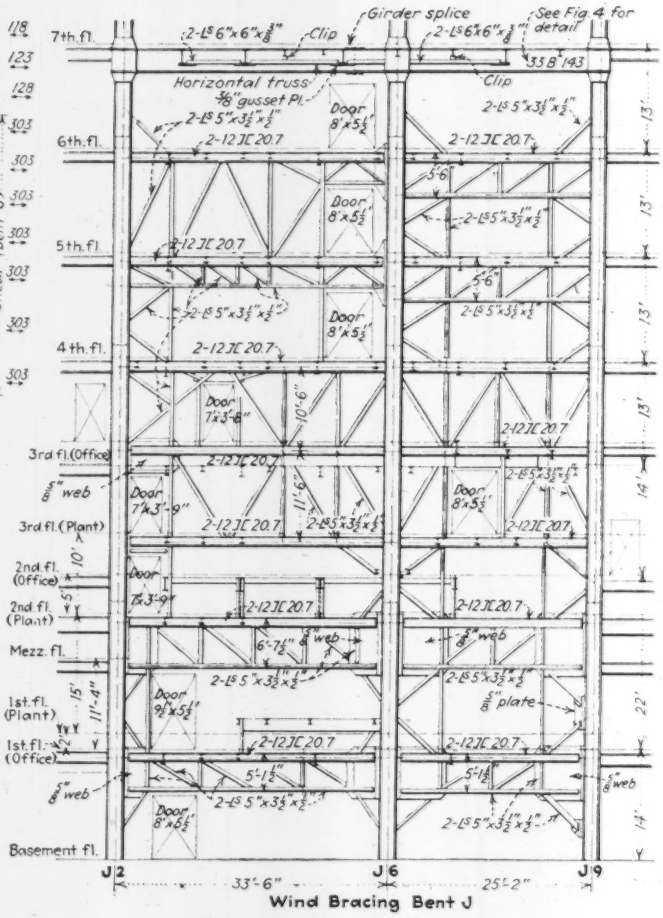


Fig. 3—Wind-bent designs

Diagrams show distribution of shear and moment and indicate the part played by the horizontal truss in the seventh floor, transferring the shear in bents *C*, *E* and *G* to bents *A* and *J*.

trolling factor. It was figured, assuming a 30-lb. per sq.ft. wind pressure and a 24,000-lb. unit (combined live, dead and wind load) stress on the steel. A cantilever method of design was followed, assuming equal shears in all columns of a bent. No wind increment was added below the seventh floor.

The general arrangement of the wind bents, *C*, *E*, *G*, *J*, *K*, *L* and *M*, is indicated in Fig. 1. Bents *J*, *K*, *L*, and *M* extend from the roof to the foundations. Bents *C*, *E* and *G*, extend from the roof down to the seventh floor only, because the flat-slab concrete construction below this level is not capable of developing the wind moments.

In the plane of the seventh floor, as shown in Fig. 1, a horizontal truss is inserted to transfer the wind shear of bents *C*, *E*, *G* to bents outside the concrete construction, namely bents *A* and *J*. The total wind shear on these three bents at the seventh floor is about 384 tons and is distributed 303 tons to bent *J* and 81 tons to bent *A*, an outside wall bent above seven stories high. Bent *J* lies in a 12-in. fire wall between the office and factory portions of the building and, therefore, could be rigidly braced to take the unusually large shear of more than 300 tons.

Horizontal Truss—The truss in the plane of the seventh floor is 39½ ft. deep, 94 ft. long and divided into four panels. As shown in Fig. 1, it is offset from the building-column lines, thus eliminating complicated connection details for the double-angle diagonal web members. In the design used, these web members connect to large gusset plates field-riveted to the bottom flanges of the floor girders, which act as chords, at points 7 to 10 ft. off the column lines. The web members, designed as double angles for rigidity, were drilled in the field to insure a proper fit. As an added precaution they are securely tied to all floor beams under which they pass. These web members are designed to take all loads in themselves, with no reliance placed in the floor slab, although it is certain that the slab will effectively supplement the truss action.

The extensive bracing system required in bent *J* below the seventh-floor level, to enable it to carry a shear of 303 tons, is shown in Fig. 3. The means adopted to insure rigidity in this bent was to utilize trusses as deep as possible beneath every floor (in some cases occupying the entire story height) and to connect these trusses to the columns by kneebraces. These braces were made deep enough to intersect at the columns, thus forming a completely triangulated system. The system thus formed was too complicated to admit of exact mathematical analysis, so that in proportioning the sizes of the individual members calculations had to be supplemented by a certain amount of judgment.

Make-Up of Wind Bents—In general, each girder in the wind bents consists of two rolled sections that straddle the column. An exception is bent *L* whose location between the elevator banks permits utilization of kneebraces from top to bottom. Bents *K* and *M* are 78 ft. 10 in. deep and include five columns, while the other bents, over the plant portion, are 58 ft. 8 in. deep and include only three columns. Typical girder-column connections are shown in Fig. 4. Girder flanges are blocked out on the side next to the column, and compensating cover plates are added to the remaining part of the flange as required. Deep gusset plates shop-riveted to the webs of the girders form the field connection to the colmun in the heavier members, while pairs of angles serve as connections for the lighter girders.

The use of these double girders in the wind bents reduces the depth necessary for the relatively long spans used in this building; ceiling headroom is consequently increased. Another advantage of double girders is that it is possible to utilize the same connection detail at each column in a wind bent (shears at all columns are equal under the wind-design method used) by running the

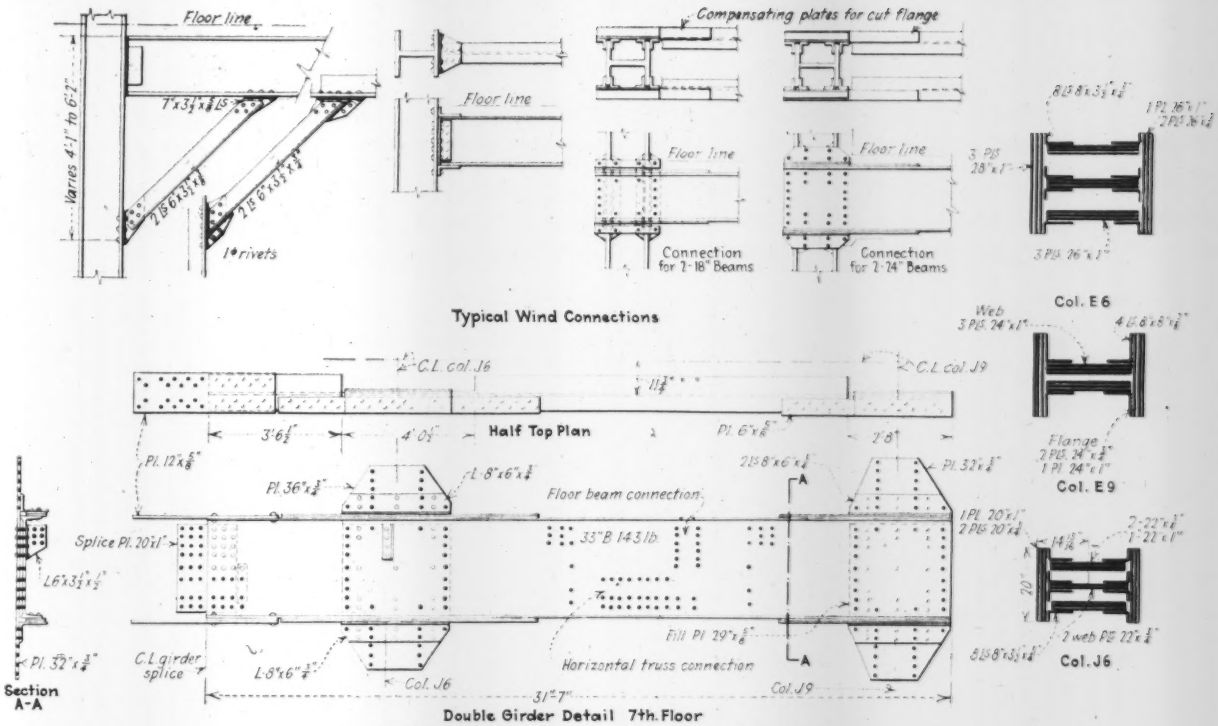


Fig. 4—Windbracing connections and column sections

girders past the columns and making splices several feet off column lines. This detail is of advantage architecturally also, being more compact than if beams were spliced on column center lines. Single rows of wind girders must necessarily be spliced at every column.

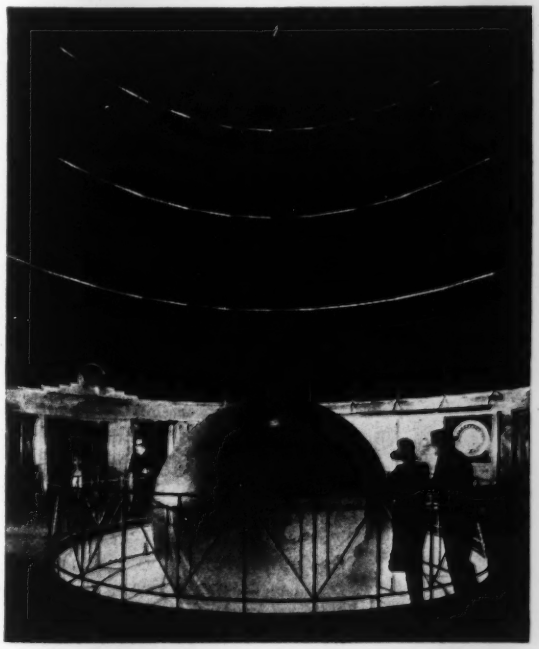
Miscellaneous Structural Details — Built-up column sections are used in the lower stories, changing to rolled H-sections in the vicinity of the fifteenth floor, depending upon load conditions and the fact that a limiting rivet length of five diameters in main material was closely adhered to. In general, the built-up sections utilize two webs, although several three-web columns are used; flanges are built up of plates as required. Typical column sections are shown in Fig. 4. The heaviest load, carried on column *E*-6, is 2,948 tons.

A circular entrance lobby three stories deep and 21½ ft. in diameter necessitated the use of a truss between the fourth and fifth floors to transfer two column loads of 1,178 tons each to columns outside the lobby area. The truss has a span of 45 ft., and the end posts are designed as columns to transfer the full loads in direct bearing.

Several other trusses were required for bracing in the west wall of the office building below the second floor and above a long line of high show windows along the alley. These trusses were 6 ft. 3 in. deep.

At the top of the building special framing was necessary to brace an unusually tall parapet wall, carried above the main roof to hide the tank room and penthouse. This wall is 31½ ft. high and is braced by two tiers of bracing only, the penthouse roof at the top and the tank-room floor 20 ft. above the 36th-floor roof. In these tiers of steel, knee-braces are used on all east-west girders, and diagonal braces are used where possible. The greater part of the area of these tiers is not floored.

The structural design described in this article was developed by Weiskopf & Pickworth, consulting engineers, New York. Lockwood Greene, Engineers, Inc., designed the concrete portions of the plant. For the Daily News Building John M. Howells and Raymond Hood were the architects. Hegeman-Harris Construction Co. was the general contractor and Harris Structural Steel Co. the steel erector.



Circular entrance lobby, Daily News Building

Indirect lighting from beneath the revolving globe provides general illumination. Charts, maps and weather instruments around wall are illuminated by shielded lights.

First Floodflow Experiments of Vicksburg Hydraulic Laboratory

New U.S. waterways experiment station at Vicksburg, Miss., announces results of tests on overflow erosion and backwater limits

TWO REPORTS on important hydraulic determinations justify the promise of the Vicksburg hydraulic laboratory to give the engineering profession constructive data on river flow and flood action. Constructed in compliance with the action of Congress, to provide works for controlling floods on the lower Mississippi River, the laboratory has been in operation for barely six months. The reports issued gives the results of experiments to determine: (1) erosion that would result from the flow of floodwater over railway embankments; and

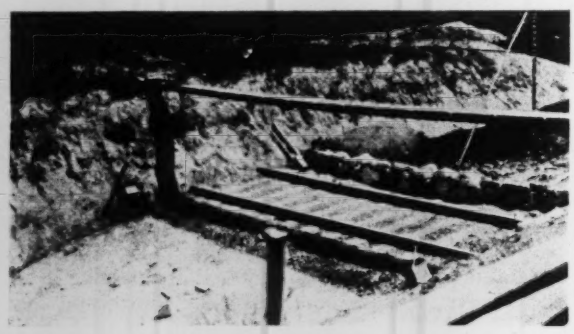


Fig. 1—Full-size model of railway embankment

(2) the limit of backwater influence in the Illinois River.

Erosion of Railway Embankment—Three sizes of models were employed. A full-scale embankment (Figs. 1 and 2) was built in the canal below the laboratory dam. It was 20 ft. long and 14 ft. wide on top, with side slopes of 1 on 5, and 3 ft. high. The fill was silt, the ballast was poor quality gravel with a large amount of sand and clay, and the track was standard. A rock sill (Fig. 1) was built along the lower edge of the crown, and the downstream slope was riprapped. One experiment was made with this model. Repeated experiments were then made with one-fifth and one-tenth scale models, using ballast and rock sills in proportion. The findings of the tests were as follows:

The experiment performed on a model of one-fifth scale produced results remarkably similar to those observed in the full-scale test except that the ballast, being good instead of poor, was able to resist the scour at initial low flow. Having resisted this flow, the gravel was carried back against the upper rail by subsurface back rolls developed in higher stages. The net result was to leave a large percentage of ballast between the ties.

Extensive experimentation on one-tenth scale models indicated that a rock sill 6 in. higher than the top of the rail and placed on the downstream side of the track would effectively protect the track and ballast against the most harmful stages and indefinite periods of flow. So the placing of the sill substitutes one large and harmless back roll for the two smaller and more intense rolls caused by the rails.

The only serious movement of 200-lb. stone used for covering the downstream slope occurs during the period of free flow, when the depth over the sill exceeds 1 ft.

Backwater on Illinois River—This experiment was to determine the limit of backwater effect from a maximum all-time stage of the Mississippi against a maximum floodflow of the Illinois River and against the flows of 1904 and 1926. The model was constructed outdoors (Fig. 3) on a horizontal scale of 1:1,200 and a vertical scale of 1:48. A 25-to-1 distortion was indicated by the small channel sections, in which turbulent flow could be reproduced only by the adoption of excessive slopes.

A channel was carved out of the solid ground to conform accurately with the data obtained from a 1:7,300 map of the Illinois and Des Plaines rivers. Overbank conditions were closely simulated and levees were established in accordance with the proposed plan of setbacks of the Chicago district engineer. A V-weir at the upper end of the model served to admit measured quantities of water; proper stages of the Mississippi River were produced by an adjustable overflow weir at the discharge end of the model. The results of the tests are given in the accompanying table.

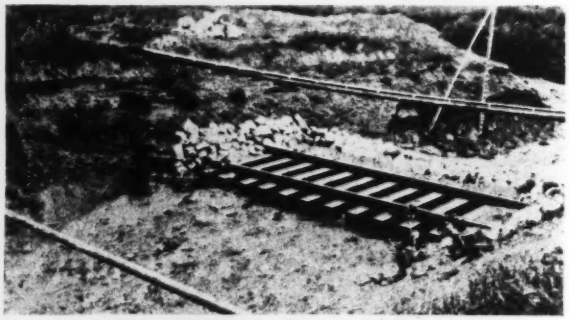


Fig. 2—Embankment model after test, showing erosion

Fig. 3—Model of Illinois River for backwater tests

BACKWATER LIMITS ON ILLINOIS RIVER AS DETERMINED BY MODEL

Place	Discharge, Sec.-Ft.	Stage of Mississippi to Produce Backwater With Setbacks	Flood Represented	Limit of Backwater, Miles Above Grafton
Havana	100,000			
Grafton	117,000	443.3	1904	107
Havana	72,000			
Grafton	120,000	443.4	1926	118
Havana	90,000			
Grafton	150,000	443.4	Maximum	116
		Without Setbacks		
Havana	100,000	443.4	1904	108
Grafton	117,000			
Havana	72,000	443.4	1926	116
Grafton	120,000			
Havana	90,000	443.4	Maximum	118
Grafton	150,000			

Expert Testimony on

Wind Design of Tall Buildings—II

* * *

Assumed Loads and Fiber Stresses

By ALBERT SMITH
Smith & Brown Engineers, Inc., Chicago, Ill.

AMERICAN architects have developed a type of building in which the tower, instead of being only an architectural expression, is the main support of the rental program. We now have towers that project from 600 to 1,000 ft. above the general line of the city roofs, and one of the important results is that the significance of wind stresses has increased enormously. Both the number of pounds per square foot and the effect of each pound increases with the height.

Unit Fiber Stresses

In making codes for engineering design, load units and fiber-stress units should be separately considered. The load units should be no greater than may reasonably be expected, and no less. The fiber-stress units should utilize as much of the strength of material as the state of the art permits. If we set up very conservative fiber-stress units, there is strong pressure on code writers to make the load units low. This is what is happening now in regard to wind-pressure unit loads and combined fiber-stress units in office-building columns. We are transferring the old domestic joint-banking-account system over to engineering practice. Overdrafts—the inevitable result—are very unpleasant.

There is too much that we do not know about the strength of office-building columns, and there is far too much that we do not know about wind loads on tall buildings. We can, however, come closer to the truth on both these points than we are now doing. Fig. 2 shows the old Chicago code column formula for columns incased in concrete (18,000—70 l/r) the formula 20,000—80 l/r proposed by the 1924 Am.Soc.C.E. committee, and the formula of the A.I.S.C., which is coming into such general use for buildings. It is apparent that these formulas are designed for the critical points of $l/r = 50$ and $l/r = 60$. Columns of the upper four stories of a tall building, if they are not fireproofed in concrete, are very properly limited by these formulas. The attempt, however, to make one formula apply to the lower columns of high buildings, to the compression members of bridges and to the struts of transmission towers has not been successful.

The columns of high buildings that receive any important amount of fiber stress from wind range in value of l/r from 30 to 12. Although there are very few tests on large columns of l/r less than 30, no one can doubt that for $l/r = 12$ the ultimate strength of the column approaches the ultimate strength of the material. The circles on Fig. 2 show the ultimate strength of columns tested by the Bureau of Standards (*Transactions Am.Soc.C.E.*, Vol. 83, p. 1,583, and *Technological Paper* 328, Bureau of Standards). These records suggest very strongly that between $l/r = 40$ and $l/r = 20$ there is a very large increase in the ultimate strength of columns. It would seem therefore that there should be little question of the propriety of using 24,000 lb. per sq.in. for the limit of fiber stress due to the combined action of dead, live and wind loads for columns whose l/r is less than 20. It also appears that 23,000 lb. per sq.in. at $l/r = 30$ leaves more safety margin than 20,000 lb. per sq.in. at $l/r = 60$. These tests as diagrammed indicate that the yield point of the material and the thickness of elements of the section have very strong influence on the point in the l/r variation at which the ultimate strength of the column approaches the strength of the material. The two tests on the 14-in. 287-lb. column suggest that if the engineer specifies a yield point of 35,000 lb. per sq.in. and obtains fulfillment of his specification, he can be assured of a column strength greater than 30,000 lb. per sq.in. at $l/r = 38$.

I would propose that the formula 26,000—110 l/r, with a maximum of 24,000 lb. per sq.in., be used for combined fiber stresses from dead, live and wind loads. The diagram shows that this formula gives a lower fiber

Fig. 1—Such jagged skylines as this create of themselves violent gusts of wind, but some observations point to other and more violent gusts originating in the main air stream far above

stress at $l/r = 60$ than the formula of the American Institute of Steel Construction and a fiber stress only a little higher at $l/r = 50$.

Wind kneebraces have such l/r that the permissible combined fiber stresses would be about the same for the two formulas. Where designs are made with stiffness principally in view and a low fiber stress is used in the kneebraces, no overstress will occur under the maximum wind load unless the wind-load units are very much too low. However, for beams that will have dead and live-load stresses combined with wind, we may have a serious overstress if the wind-load units have been underestimated.

In all the tall building designs I have seen, the rivets seem to have been designed for 18,000 lb. per sq.in. of

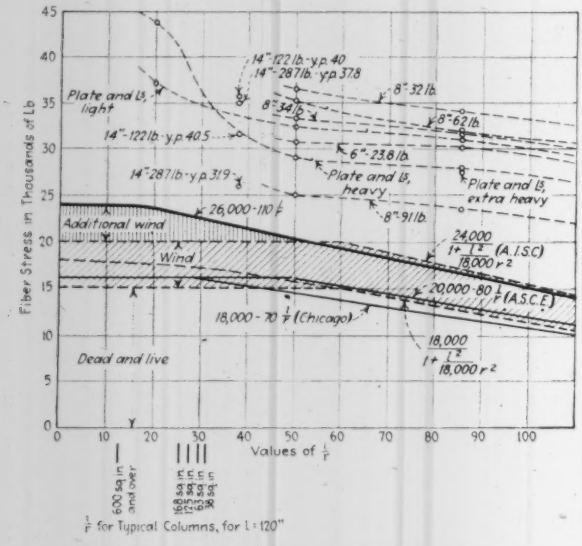


Fig. 2—Comparative column formulas together with strengths and yield points of tested columns

Author recommends formula 26,000 — 110 l/r.

shear. At that stress there is considerable slip, and, if the wind loads are 50 per cent greater than the unit loads used in computing the stresses, we would have 27,000 lb. per sq.in. of shear in the rivets. Under this stress the inelastic yielding of the joint is very large.

Underestimation of wind loads invalidates the determination of stability. If the dead load in the column is enough larger than the true wind tension, no harm will be done; but if our specifications are such that our structure is stressed to the limit of safety in respect to beams, braces, brackets, rivets and bent anchorages under a given wind-load unit, we should be sure that the wind-load unit is high enough. We must preclude the possibility that an unanchored column may have a tension from wind greater than its compression from dead load.

Unit Wind Loads

Examination of the question of unit wind loads may be divided into four steps:

1. The velocity of the main current of air in the most severe hurricane expected.
2. The diminution of average velocity as we leave the main current above and approach the earth.
3. The characteristics of gusts and their effect in modifying the average velocity curve to produce the largest effect expected.
4. Pressure produced by velocity.

1. At Cairo, Charleston, Chicago, Detroit, Minneapolis, New Orleans, New York, St. Paul, Savannah and Toledo, the corrected maximum 5-min. average velocity over a period of many years equals or exceeds 66 m.p.h. We have enough gust records to prove that 50 per cent is the lowest increase of gust maximum over average velocities that can safely be assumed. In other words, these long-time records prove that at all these stations there have been gust velocities of 100 m.p.h.

How do these gusts originate? Many of the gusts we meet on city streets owe their force and direction to the obstacles that they pass. There are on record pressure tests on obstacles in the path of a wind of known velocity that prove that the velocity of wind strata passing next to the obstacle is much greater than the general wind velocity. Any obstacle, therefore, creates a gust whose size depends on the size of the obstacle. Such sheets of gust are narrow and soon dissipated. They cannot be the same gusts or even cause the gusts that we measure at observing stations far above the level of any obstacles. One must conclude that the highest gust velocities that we observe are the velocities of the main current of air above. The New York station observed during a wind the 5-min. velocity of which was 74 m.p.h., a 1-min. maximum of 91 m.p.h. The total length, from low to

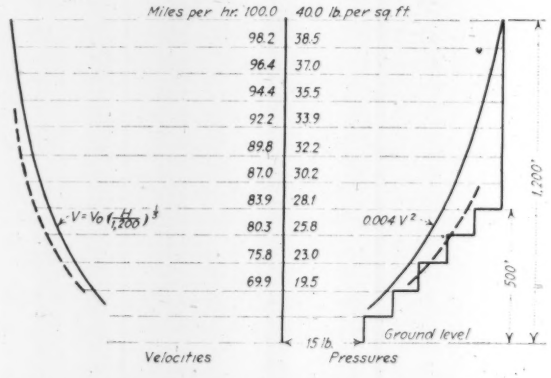


Fig. 3—Hellman's equation applied to 100 m.p.h. at El. 1,200 to determine velocities at lower levels

low, of this gust must have been several miles. Its maximum velocity must have been considerably over 100 m.p.h. Such a gust observed at a height of 454 ft. must have originated in the main air current above.

We arrive then at the conclusion that a wind whose velocity in its main high current is 100 m.p.h. should be expected over any city east of the Rocky Mountains. For the Florida east coast, for Gulf cities and for the districts in which tornadoes are frequent, it is advisable to provide for more.

2. Turning now to the height-velocity variation, Dr. C. F. Marvin, chief of the weather bureau, authorizes me to quote from his letter:

> As you know, the velocity of the wind commonly increases rapidly but not linearly, with increase of height up to the level of roughly 1,200 to 1,500 ft. Beyond this height what may happen is less certain and for your present needs not particularly important. For the heights in which you are especially interested, perhaps Hellman's empirical equation (applicable to open country)—$\frac{V}{V_o} = \left(\frac{h}{h_o}\right)^{\frac{1}{7}}$—is as good as any other so far developed. In this equation V is the actual velocity of the wind at the height h, and V_o its velocity at the height h_o, provided h_o is not less than 50 ft.
>
> Gusts, as you know, are irregular in size, direction and velocity. As a rough approximation we may say that the velocity of gusts

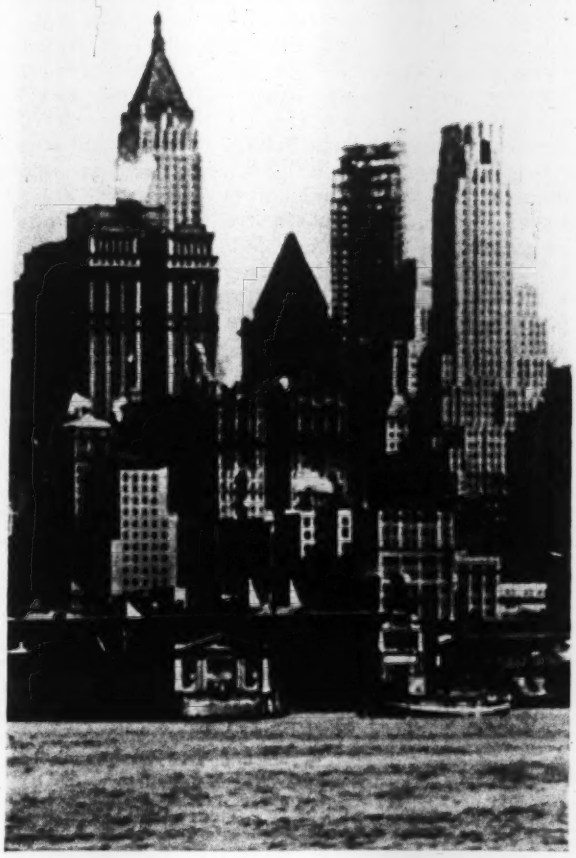


Fig. 4—A building's wind exposure often changes radically

The pyramid top of the Bankers Trust building in New York has, within the past few years, been shielded by such towering structures as the Manhattan Company building, the City Bank building and the Irving Trust building.

varies from half to twice the average velocity of the wind, though occasionally these values are passed. It is also true that near the surface gusts are smaller in size and more numerous than they are at greater heights, though how they vary in either respect to height is practically unknown.

For a building with clear exposure to the base, Hellman's equation referred to 100 m.p.h. at 1,200 ft. elevation would plot as shown in Fig. 3. These are average wind velocities. If the gusts were quite small the most effect on the 1,200-ft. tower for a 100-mile wind would be expressed by these figures. We can show that at the site of the Forth Bridge in Scotland, gust width, from low to low, is probably not over 30 ft., near the surface of the earth. If there were many of greater width, Baker's targets at the Forth Bridge would have shown less disparity of pressure. In any locality near the surface of the earth in a clear exposure we would be justified in using the average velocity of the wind.

3. Stanton's observations on the high footway of the Tower Bridge at London indicated that at 140 ft. above the water the gust areas were so large that the whole structure should be considered as affected. It is apparent that the character of the approach surface has much to do with the size of the gusts near the surface and that this influence may be visible for a considerable height. This fact prevents us from taking any local observations at small height as generally determinative.

Our regularly recurring gusts in high winds observed at high stations are due to the turbulence in the lower 1,200 ft. This turbulence is caused by the intermingling of high and low currents. The low current, retarded by unevenness of approach and by friction, is penetrated by bodies of high-velocity air from the main current above, which tend constantly downward to compensate for the slower movement below.

It seems very clear that we do not have splinters of high velocity wind breaking off at, say, 1,200 ft. height. It seems reasonable to suppose that the gusts between 500 and 1,000 ft. may be several hundred feet wide and deep. If this is so, the curve in Fig. 3 must be modified as shown by the dashed line, to allow for one or more large gusts covering a large proportion of the exposure.

4. Wind velocity of 100 m.p.h. produces a horizontal force on a tower of 40 lb. per sq.ft. of the face normal to the wind direction, if the height is as much as four times the width (Dryden and Hill—Scientific paper No. 523, p. 731).

In Fig. 3, on the right hand of the zero vertical, are shown the pressures for the velocities expressed by the full line on the left. I would propose the following as proper wind pressure units:

Height, Ft.	Lb.	Height, Ft.	Lb.
0 to 100	15	300 to 400	30
100 to 200	20	400 to 500	35
200 to 300	25	500	40

No code should permit zero pressure for certain portions of the building on the assumption that such areas are sheltered. In any city, buildings are built that in some direction have no shelter. The omission of loads on account of shelter should be made a special decision for each building.

I feel no assurance that the loading listed above may not be exceeded on very high buildings in any city of the country; yet, with the exception of buildings in the special localities mentioned above, I think one may feel sure that no structural damage will be produced by wind in buildings designed by proper fiber-stress units for the unit loads.

Proportioning the Frame

An ideal wind frame is one in which all the bents have the same deflection at each story from both chord and web action. To make the stresses determinate, it is necessary that the stiffness of the bracing in all bays or at all joints be so proportioned that the wind chord fiber stress in the column shall be proportionate to the distance from the center of gravity of the sectional area of the columns in each bent. Secondary stresses will be produced if the centers of gravity of all the bents do not lie in the same straight line.

When the centers of gravity of the bents do lie in the same straight line, it is as yet impossible to design a perfect frame. Allowing that we can determine closely the relative stiffness of the bracing in the various bays and that we can select sections closely following the requirements, it is not possible, with riveted joints, to secure proportional inelastic deflection. For instance, where in two bays of a bent we have diagonal braces with arms of 9 ft. and in four bays of the same bent we have 21-in. beams with I-beam lug connections, the inelastic yielding of the bracing in these bays is very unequal; and, at the maximum wind load, the division of wind shear between the different bays will not be that apparently secured through the design for stiffness of the sections. The diagonal braces will have rivet slips at each end. At 18,000-lb. shear the slip will be approximately 0.0015 in. (*Proceedings*, American Railway

Engineering and Maintenance of Way Association, Vol. 6, 1906, p. 272.) The inelastic deflection in an 11-ft. story will be $2 \times 0.0015 \times 11/9 = 0.0037$ in. For the lugged beams the inelastic deflection will be $(2 \times 0.0015 \times 11) \div 1.75$ ft. $= 0.0189$ in.

Where the beam lugs are so arranged that two slips are involved at each beam flange, the inelastic deflection per story would be 0.0377 in. If then, the design was based on deflections of 0.125 in. per story, as is sometimes done, it is evident that the lugged beams would carry much less than was assumed and that the diagonal braces would carry much more.

The rapid development of field welding for buildings gives us promise of a day when our wind connections will not require the large number of lug angles and rivets now used, and in which the slip of rivets will not affect the distribution of stress. When field welding is so developed that we can have confidence in the design of our field joints and in the execution of the welding in the field, we will be able to secure very stiff windbracing with a minimum of materials. Meanwhile, in important jobs, it would be advisable to use field welding in addition to the rivets to prevent inelastic deflection.

The use of deep kneebraces and long diagonals instead of brackets or lugs undoubtedly makes the structure much stiffer. Any member attached to the structure at two different elevations (and, of course, that is the condition that causes the bracing action of a wind member) tends to share in the dead and live load of the column. Full diagonals tend to get more than half as much dead and live-load fiber stress as the columns receive, unless the beams are very small in area. In K-bracing, this secondary stress will be diminished by the bending of the column; but if the column is very large, the relief from such bending may be small unless the base of the angle of the K is large. This secondary stress may be made a minimum by making the K horizontal. The vertical wind shear is then carried by two cantilever trusses in each bay. Where the wind moments are very heavy, the economy from the direct action of the truss members will more than overcome the small secondary framing for floor-beam loads. This sort of framing causes a minimum of interference with the windows.

Meanwhile, most of our buildings, even the highest ones, are so planned by the architect that a perfect wind frame cannot be made. Where a perfect tower framing descends into the framing of larger floors below, the wind stresses become indeterminate. A building with a single wing can be analyzed only approximately for wind stresses. Making a design that is both stiff and strong in such cases is an art. It is an art, however, that needs all the technical formulas, research and technical judgment that is available to assist the artist.

Hydraulic Lime in Concrete

By G. W. HUTCHINSON
Consulting Engineer, Riverton Lime Company, Inc., Riverton, Va.

CONCRETE is a mass of inert aggregate bound by *any* cementitious material, in spite of the rather common view that the binding material must be portland cement. There are other and older materials of a cementitious nature, notably hydraulic lime, that are suitable for concrete and the use of which in combination with portland cement seems to hold much promise for the improvement of concrete, especially in respect to durability. The writer has recently planned a laboratory investigation to determine the value of hydraulic lime in combination with portland cement in making concrete. The observations and test results that follow are based upon this work. The data represent the most comprehensive, if not the only available, research into the problem of combining two hydraulic materials in an effort to produce better concrete.

Hydraulic lime is an old material and is recognized as a leader among the so-called permanent building materials. As differentiated from hydrated lime, and from most inert admixtures, it possesses definite hydraulic properties. It has many advantages in regard to weathering, volume change and such other properties as have been shown necessary to improve durability. On the other hand, it does not have the advantage of high-early-strength such as is obtained with portland cement. Such facts suggest that, by a design in which portland cement is used to obtain the greater part of the early strength and hydraulic lime to supply the additional qualities of watertightness durability, uniformity, etc., a structure may be obtained that increases in quality with age. With regard to all requirements of successful concrete, such a combination presents a better-balanced design than might be obtained with either material alone. In view of the fact that hydrated lime has been used successfully as an inert admixture with portland cement for many years, the production of a material such as hydraulic lime, possessing the same properties as hydrated lime and also definite cementing properties, seems to offer many economic advantages.

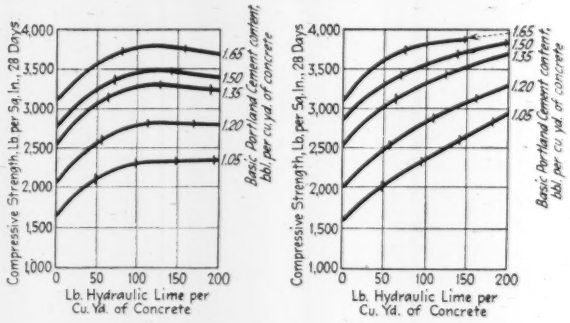


Fig. 1—Effect of combinations of hydraulic lime and portland cement on concrete strength

The curves at the right are corrected for the volume increase of the concrete, caused by the addition of hydraulic lime, by means of a correction factor obtained from the data plotted in Fig. 2.

The graphs in Fig. 1 show the effect on compressive strength of combining hydraulic lime with portland cement in concrete. It will be noted from the curves at the left that as the amount of hydraulic lime is increased above about 25 per cent in the richer mixtures the volume increase of the concrete due to the hydraulic lime reduces the portland cement content to a point where the strength falls off, as indicated by the change in direction of the

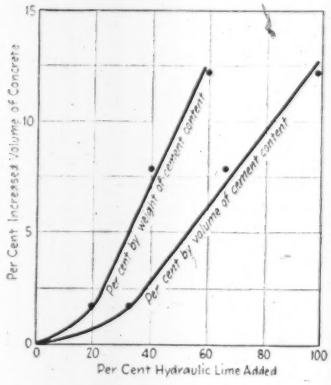

Per Cent Increased Volume of Concrete
Per cent by weight of cement content
Per cent by volume of cement content
Per Cent Hydraulic Lime Added

Fig. 2—Effect of hydraulic lime on the volume of concrete

curves. The curves at the right (Fig. 1) are corrected for volume increase of the concrete caused by the hydraulic lime; the correction factor is obtained from the data plotted in Fig. 2, showing the relation between increased volume of concrete and per cent of hydraulic lime added.

The corrected curves in Fig. 1 (those at the right) show that the compressive strength of the leanest mixture (1.05 bbl. basic portland cement content) to which 50 per cent of hydraulic lime (200 lb.) has been added is of practically the same strength as the straight portland cement mixture containing 1.50 bbl.—about 2,900 lb. per sq.in. Thus, the addition of 50 per cent of hydraulic lime to a lean mixture provides the same strength as does a 50 per cent increase in portland cement. The importance of this fact is that the cementitious powder content per cubic yard of concrete of the hydraulic lime mixture is 1½ cu.ft. more than in the straight portland cement mixture. The hydraulic lime, being of greater fineness and plasticity, contributes other factors generally recognized to be desirable for increased uniformity, watertightness, etc. The water-cementitious-material ratio of the combined material is 0.80, while in the mixture using portland cement alone it is 0.92.

With the high strengths being secured from present-day portland cements, it becomes more necessary than ever to balance design. To use a given portland cement content with strength as the only consideration would mean that the paste content would be too low in most cases to meet the requirements for workability, watertightness, uniformity, etc., now regarded as criteria of durability and permanence. Fig. 3 indicates the result of portland-cement hydraulic-lime combinations in giving variable strengths with the total paste content constant. Adjustment of the relative amounts of these two materials would allow desired strength at a given age and the maintenance of a paste content irrespective of strength but consistent with the other requirements of concrete.

In Fig. 1 it was noted that a concrete containing 1.05 bbl. of portland cement and 200 lb. of hydraulic lime had approximately the same strength as a concrete containing 1.50 bbl. of portland cement alone, but that the water-cementitious material ratio for the former was only 0.80, while for the latter it was 0.92. Data relative to the effect of the water-cementitious-material ratio are plotted in Fig. 4. It will be noted that the top curve *A* is for portland cement with no hydraulic lime combination and is the usual curve secured by plotting water content against compressive strength without consideration for the actual amount of portland cement in the mixture. Curve *F*, on the other hand, represents the mixtures containing a basic amount of portland cement (1.05 bbl.) per cubic yard of concrete, to which has been added hydraulic lime in various amounts up to 80 per cent by volume of the portland cement content. The curves intersect at the point on curve *A* where 1.05 bbl. of portland cement and no hydraulic lime is used. As the hydraulic lime is added in increasing amounts the curve diverges from curve *A*. The effect of the water content on the strength of the concrete obtained by these changes can be noted by comparing the direction of the curves. For example, the compressive strength of the mixtures on curve *F* is 2,500 lb. per sq.in. with a water ratio of 0.85. It becomes 2,000 lb. at 1.05, a loss of 500 lb. with an increase of 0.20 in the water ratio. In the portland cement mixture (curve *A*) the same increase in water ratio has decreased the compressive strength from 3,200 to 2,300 lb., or a decrease of 900 lb.

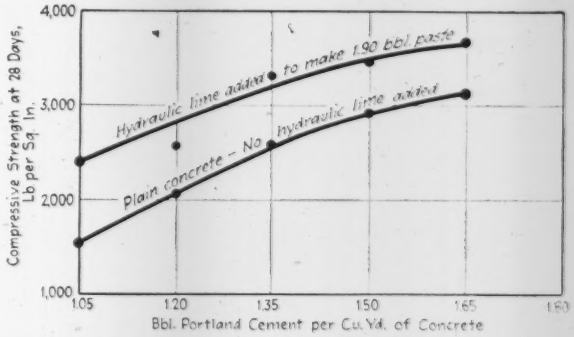

Compressive Strength at 28 Days, Lb per Sq. In.
Hydraulic lime added to make 1.90 bbl. paste
Plain concrete — No hydraulic lime added
Bbl. Portland Cement per Cu. Yd. of Concrete

Fig. 3—Effect on concrete strength when hydraulic lime is added to obtain a given paste content

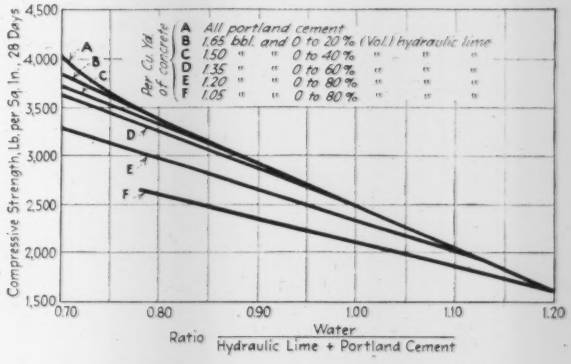

Compressive Strength, Lb. per Sq. In., 28 Days
Per Cu. Yd. of Concrete
A All portland cement
B 1.65 bbl. and 0 to 20% (Vol.) hydraulic lime
C 1.50 " " 0 to 40% " " "
D 1.35 " " 0 to 60% " " "
E 1.20 " " 0 to 80% " " "
F 1.05 " " 0 to 80% " " "
Ratio Water / Hydraulic Lime + Portland Cement

Fig. 4—Change in effect of water ratio on concrete strength with various combinations of hydraulic lime and portland cement

against 500 lb. in the case of the mixture that has used a combination of portland cement and hydraulic lime.

With lack of control existing in present practices of making field concrete, the variation in water content is of importance. Any method by which a greater variation in water content can be tolerated without adverse effect on strength cannot help but be a contribution to the elimination of the non-uniformity well recognized as existing in field concrete.

Conclusions

Concrete of today should not be confined to the use of portland cement alone, for authorities are agreed that strength is no longer the only yardstick by which all properties of concrete may be measured. The need for durability and permanence leads to consideration of the successful performance of other materials.

One of the greatest advances in practicable concrete is the realization that we departed from successful methods when we allowed the modern requirement for speed and

low cost to lead us away from the use of drier consistencies.

The water ratio may be applied and will hold true, within limits, for all hydraulic materials. It is not characteristic of portland cement alone.

In making better concrete, two factors must be controlled—design of the mixture and the methods by which concrete is placed in the field. The design of the mixture is of first importance and must provide sufficient plasticity or workability, regardless of other considerations, to prevent segregation. Physical defects are caused by the evaporation of excess water over and above that required for the chemical reactions during hydration. As we are forced to use this excess water in concrete, our only hope is to reduce the amount to a minimum, and to control the bad effects of that we are forced to use by the best means available, namely by using the best means of distributing it uniformly throughout the mass.

It is believed that the tests outlined here are conclusive enough to, at least, warrant consideration and additional study of the possibilities of hydraulic lime in contributing needed properties to concrete.

Precast Asphaltic Sewer Joints Solve Wet Trench Problems

By E. FRENCH CHASE
Sanitary Engineer, Department of Streets and Sewers, Seattle, Wash.

SEWER JOINTS of asphaltic rings precast in the bell and on the spigot of the pipe recently were used with marked success in the city of Seattle for an intercepting sewer where extreme groundwater conditions in clay and quicksand formation on a pumping line made effective joints of extreme importance. Previous trouble experienced by the city with root growths, combined with numerous sewer failures caused by leaky joints with subsequent washout and collapse, prompted the test of the asphaltic joint in place of the cement-mortar type. The new joint is similar in some respects to the Stanford coal-tar joint used in Europe, but it has been improved as to jointing material, the method of application to the pipe and the resulting characteristics of the joint.

The project on which the new joint was introduced is the initial step in a major improvement program in the Seattle sewerage system, which ultimately will eliminate all sewage disposal into Lake Washington at an estimated cost of over $5,000,000.

The present unit of construction consists of about 5 miles of vitrified clay sewer from 8 to 24 in. in diameter and two pumping plants. Ultimately, there will be 16 pumping stations on the line with a monthly power consumption costing between $2,000 and $2,500. Construction conditions are severe, including deep trenching through clay and quicksand with a portion of the line below the lake level. In addition, operation as a pumping line made the problem of infiltration of extreme importance, and these two factors, together with unsatisfactory experience with former types of joints, resulted in the adoption of the precast asphaltic joint for the project.

Manufacture of these joints under plant conditions by skilled workmen is in decided contrast to the problem of producing good joints under field conditions. The process consists of casting asphaltic rings to form the joint on the bell and spigot of each pipe section. The material is about 60 per cent inert matter that is ground from pipe fragments and 40 per cent asphalt. The resulting compound is flexible at freezing temperature, softens at 212 deg. F. and flows at 300 deg.; the penetration is from 6 to 8 at 77 deg. These characteristics are for a standard mix and may be modified to provide for different requirements.

The scarified bell and spigot of the pipe length are painted with a solvent about one hour before applying the hot asphalt, assuring proper adhesion to the pipe, which is essential to the success of the joint. Machine-made molds for both halves of the joint are provided with a sight taper. Molds for the spigot end are placed on a leveled pouring platform, and the ends of the pipe are centered in them by eye. The molds for the bell end are placed and the rings poured with the asphalt at a 400-deg. temperature, as shown in the accompanying illustration. Prior to pouring, the molds are whitewashed to prevent sticking and provide a coating on the joints to make handling easier. Following pouring, the molds are allowed to remain in place until the compound has cooled and shrinkage completed.

Transportation from plant to point of use was con-

Making asphalt sewer joints
Machine-made steel forms used to make tapered asphalt rings.

sidered a problem attendant to this method, but no difficulty has been experienced with the injuring of the joints during shipment. On the present project only a few lengths have arrived with damaged rings, and the contractor has utilized these in places where half lengths were required.

Simplified laying procedure under adverse conditions is a particular advantage in the use of this joint. Just before they were lowered into the trench, the collars on both ends are swabbed with a solvent that livens the surface of the asphalt. The pipe lengths are lowered into the trench by ordinary methods, placed in position and "shoved home" to complete the simple laying procedure. For sizes under 21 in. a properly anchored bar provides sufficient leverage to close the tapered joint. An ordinary hand-jack with a trench brace is used for 21-in. pipes or larger. Within an hour after the joint is laid, tests proved that it becomes a homogeneous mass even when laid under water.

This property of consolidation is of particular importance as it permits construction practices which materially reduce costs and assure a tight joint under extremely adverse conditions. Before placing the length being laid, the workman merely removes by hand any pebbles or large material from the bell of the previous pipe, and any sand or silt that remains is consolidated in the joint itself. Tests have indicated a successful joint after the pipes have been subjected to a freezing temperature for 48 hours prior to jointing. Other tests have shown no sign of leakage at the joint with pressures of 70 lb. per sq.in., although this test did not indicate its ultimate strength.

The ability of the joint to withstand leakage or infiltration is of particular significance on a pumping line such as the present project. In the words of George E. Hammond, designing engineer, Bureau of Sewers, Borough of Brooklyn, N. Y., "Municipalities are wasting princely sums in pumping and treating such groundwater at purification and disposal works." In addition, a tight joint prevents a groundwater contamination from a sewer passing through an area containing wells.

Principal advantages of the new joint, in the writer's opinion, are summarized as folows:

1. *Production*—Manufacture under plant conditions by skilled labor eliminates uncertainties of trench construction and insures a uniform product, easily inspected. The pipe is clean and dry when the joint is poured.

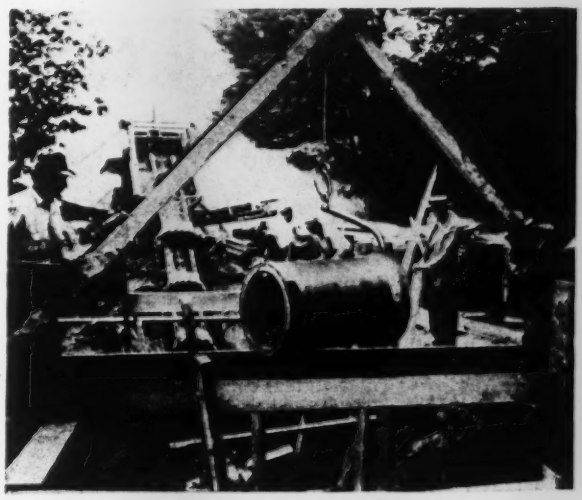
2. *Construction* — Facilitated by less dependence on weather conditions; laying can be done under water with elimination of much trench pumping; saving in trench or tunnel size because of less working space required; drainage and backfilling permitted at once; simplified inspection.

3. *Resulting Joints* — Concentric or evenly spaced around pipe; easily made to conform to line or grade; slight displacement permitted without breaking joint or pipe; root-proof and acid-resistant; watertight up to at least 70 lb.; not affected by extremely dry soils.

4. *Design Improvement* — More assurance of completely sealed joint lowers cost of pumping and purification equipment because of decreased infiltration; sewer free from obstruction with increased flow; easily cleaned or dragged.

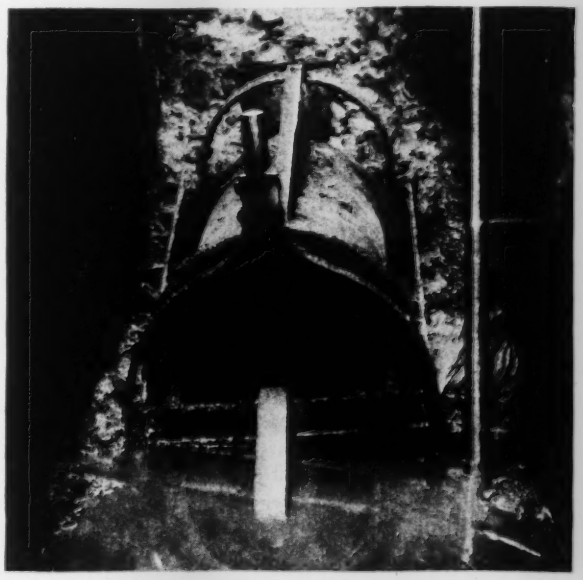
5. *Cost*—Extra cost of joint is more than offset by saving in laying operations, reduced width of trench, less pumping, quicker backfilling and reduced inspection.

6. *Diversified Use*—Such a joint may be adapted to vitrified clay, concrete pipe, or other types of material; any similar material may be used and characteristics so modified as to meet unlimited variety of conditions; this type of joint is adaptable for sewers or other conduits used for the conveyance of water under moderate heads.



Method of lowering

Rings are swabbed with solvent before being lowered into trench.



Pipe laid and joint made under water

Each length is pressed to tight tapered fit and may be used immediately for drainage.

Development of this joint was made under the direction of J. C. Johnston, northern division sales manager of Gladding, McBean & Co., manufacturers of the pipe for the project. He was assisted by H. E. Faulkner, engineer of tests, Seattle, together with W. E. Lemley and Howard Manser of the same company.

Filtered-Water Conduit (Correction)

In the sub-title of this article in *Engineering News-Record* of April 23, p. 690, the leakage rate, given as "150 gal. per minute per inch diameter," should read "150 gal. per day per inch diameter." The leakage is described accurately in the text, p. 691.

Inflows Block Construction of Aqueduct Tunnel for Athens, Greece

Nine-mile water-supply tunnel diverted to avoid dangerous ground after long fight against squeezing, flooding and plugging

By R. K. KEAYS
Engineer, Ulen & Company, on Boyati Tunnel for Athens Water Supply

CLASSICAL ATHENS is developing a new water-supply system to supplement the one constructed in the time of the Emperor Hadrian and continuously used since the second century. The new system is strictly modern, consisting of a storage reservoir and dam, a 20-mile aqueduct from the dam to the city, and a filtration plant and service reservoir at the city. The general map of the project shows the several parts of the system, which may be briefly itemized as: (1) the Marathon dam, a marble-faced monumental masonry structure of gravity section 177 ft. high; (2) the reservoir, impounding 41,000,000 cu.m.; (3) the Boyati tunnel aqueduct through the long low saddle between the Parnes and the Pentelikon mountain masses; (4) a control works at the Boyati south portal, delivering to the Halidonou tunnel aqueduct, which, including the short Kokinara aqueduct bridge, is 1.55 miles long; (5) a cast-iron inverted siphon 36 in. in diameter and 3½ miles long; and (6) the filter plant and the service reservoir for Athens and Piraeus. This article describes the construction of the long and difficult Boyati tunnel, with a horseshoe section 7.54 ft. wide and 7.87 ft. high inside a concrete-block lining and a length of 8.37 miles.
—EDITOR.

THE BOYATI TUNNEL, except for about 1,650 ft. in very compact marble, was in ground that had to be immediately supported. Some of this unstable ground can properly claim rank among the heaviest materials ever encountered in tunneling. In this material, a chlorite schist, the concrete-block lining was smashed in two hours, and timber had to be reset as many as four times before the squeeze was stopped. Even the hard marble was remarkable, but in the contrary way that it established a record for the amount of dynamite required. The great difficulty came from the chlorite schist and from water in a creviced and cavernous limestone. They made it necessary finally to divert the line of the tunnel around this area.

The tunnel is 8.37 miles long, with a horse shoe section 7.54x7.87 ft. inside a lining of precast concrete segments set six to a ring, as shown by Fig. 2. The tunnel was planned without shafts; later an emergency shaft was sunk in the battle against water and flowing chlorite schist. The cover is shallow, being seldom over 600 ft. The grade ascends from each portal to a summit at the middle, but the grades are very flat, exceeding 0.1 per cent only for short distances near the portals and for some distance being only 0.05 per cent. In operation, therefore, the north half of the tunnel is under pressure, but the chief significance of the flat grades is the difficulty they offered to drainage when water was encountered in construction.

In planning the tunnel there was no information from borings. At a later period during construction, borings were made about ⅔ miles apart. Without knowledge at the start of underground conditions it was planned to line only the south half of the tunnel; the north half was assumed to be in mica schist good enough to serve without lining. The facts proved quite different. The north bore soon gave trouble; driving from the south proceeded normally until the heading met the rock region that had caused trouble at the north.

Driving the North Heading Into Trouble

The north heading began in the mica schist that had been expected, but it was poor rock and continued only for about ⅔ mile. Then came broken-up limestone formations with no distinct bedding. These were followed by

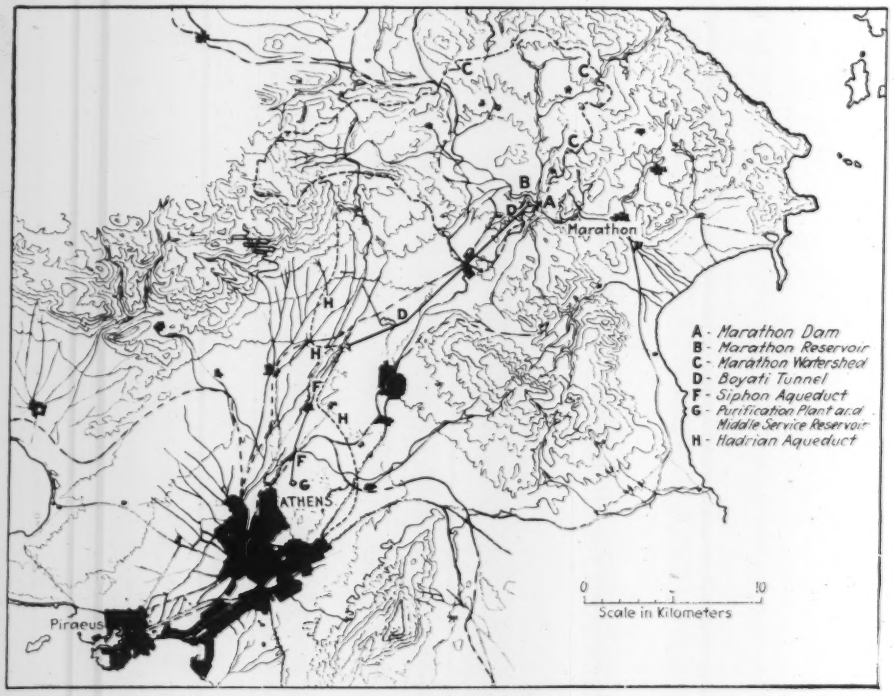


Fig. 1—Map of new water-supply system for Athens, Greece

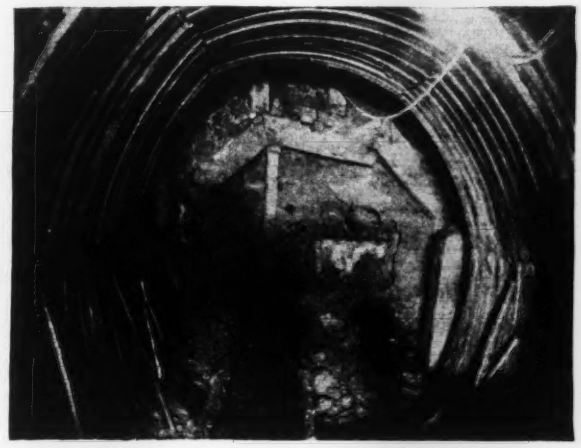


Fig. 2—Tunnel close packed by inflow of fine material

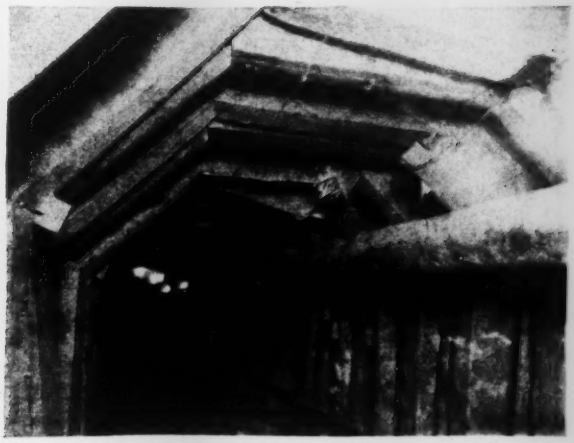


Fig. 3—Effect of squeezing ground on timber sets

a formation, the origin and nature of which have not been satisfactorily explained, but it is supposed to be a chlorite schist. It was a black material of about the consistency of stiff clay in which there were numerous rounded boulders of marble and quartz. In places it showed some indications of a gneiss-like structure, there being thin continuous laminations of quartz or calcite, and of chlorite, which in this case was also hard. The chlorite schist was followed by about 1,650 ft. of compact marble and then the chlorite again.

At this stage of the advance the block lining was far behind the excavation; virtually all of the excavation except that in the marble was supported by timber sets. Meanwhile, the borings previously mentioned were made. The purpose of these was to ascertain the geological structure and water conditions, to aid in ventilation, to serve as a means of carrying electric power into the workings and to provide means of checking the surveys. The holes were started at 12 in. and were stepped down to 10 and 8 in., and in one case to 6 in. These holes on the north side were hard to drill; hole 5, at about $2\frac{3}{4}$ miles from the north portal, struck cavernous limestone containing water and could not be driven. The location of this hole is shown in Fig. 6.

The second stretch of the black chlorite turned out to be very heavy. Timber (Fig. 3) had to be reset as many as four times. It seemed to be of no use to put in extra heavy sets, for they were quickly pushed out of position or broken. Lining with the regular tunnel blocks immediately after the excavation was tried, but the blocks were broken up in two hours.

The ground being dry and plastic, the movement was slow. It was not especially difficult or dangerous to reset the timbers, and this work was done without interfering much with the heading progress. After the timbers were reset several times the pressure diminished, and after that the lining could be placed.

Trouble Comes With Water

With excavation at about $2\frac{3}{4}$ miles from the portal the color of the chlorite became brown but otherwise seemed unchanged; analyses showed only traces of lime. Water, however, began to appear in the heading, first a stream at the bottom and then from overhead, both bringing in material, until the next day the heading was full and the flow from overhead was $5\frac{1}{4}$ gal. a second. A sudden inflow of 53 gal. a second occurred the following day but plugged itself in about four hours. Another inflow of about $79\frac{1}{4}$ gal. a second followed a day later but ceased in a short time. The sixth day there was a burst of $92\frac{1}{2}$ gal. a second from the first inflow, which lasted about 24 hours. Following each of these inflows the water level dropped in the boreholes above (Fig. 6). During the week of inflows the tunnel could not be entered for any distance.

When the final big flow had stopped, an inspection of the tunnel showed fine black silt increasing in depth from the portal. At 1,280 ft. from the end of the old heading the silt covered the track 2 ft. deep. Here a sandbag bulkhead was built to prevent, so far as possible, any further inflows. Practically no water was then coming from the heading.

The tunnel was cleaned out from the portal to the bulkhead, and all attention was devoted to lining up to that point. The track level was also raised so that there would be less danger of flooding. On Dec. 13, 1928, this work was virtually complete to the bulkhead.

The wrecked condition of the tunnel beyond (Fig. 4) was now revealed. The timber sets were all out of place and all more or less crushed; timber caps had settled and posts were forced in an average of 12 in. The depth of muck rapidly increased until at 500 ft. from the old heading the tunnel was full. It was so full that there was not even a cubic inch of empty space in the top of the tunnel between lagging or blocking. The only way to account for the complete filling of the old heading (Fig. 2) is to assume that after the inflow the surrounding ground continued to squeeze until the material was so compressed that it furnished resistance to further squeezing. In fact the material as excavated was quite compact and would stand with a vertical face. In re-excavating this section, it was necessary to set new timbers and follow them up immediately with the lining. To reinforce the concrete blocks, they were backed up on the outside by 16 to 20 in. of masonry laid in mortar. There was no particular difficulty or danger in this work as there was no water, the material seemed to have lost much of its original pressure, and there was no tendency to cave.

Conditions became worse as the old heading was approached. There were indications here that a channel had been washed out above the old timbers. Greater precautions were taken. Annular rings of concrete were built at intervals inside the old concrete lining, and sets of stoplogs were kept on hand to drop in front of these ring bulkheads in case of a sudden inrush. Near the old

heading the old timber sets began to break up and crush altogether as soon as exposed.

The advance, however, was pushed on to a distance of about 98 ft. from the old heading, at which point decided difficulties appeared. The material seemed to be saturated with water, so that it behaved more or less as a liquid, although no free water but a little seepage appeared. After attempting to excavate for another advance the material began to move en masse and could not be held. Heavy timber braces placed across the end of the completed lining were promptly broken. The 16½-ft. space between the end of the lining and the first annular ring was then filled with sandbags to form a bulkhead. This bulkhead was not strong enough, and the pressure from the heading forced the whole mass back more than a meter. Timbers were then placed across the concrete ring (Fig. 5), which was sufficient reinforcement for the bag bulkhead to hold the pressure. As no water appeared, the assumption was that the motive force behind these phenomena was the 250-lb. pressure of water known to be just ahead.

After the bulkhead was placed considerable effort was devoted to exploring for the water. Holes were driven directly into the heading and diagonally upward for a distance of 33 ft., but no water appeared. A few days later, near the end of April, 1929, the bulkhead was taken down and the bags of sand were removed, with the idea that the material had reached a state of stability. As soon, however, as the sandbags were removed, the material, which had already pushed its way a meter or so inside the concrete lining, began to move again like a piston in a cylinder and with great force. The bulkhead was hastily replaced.

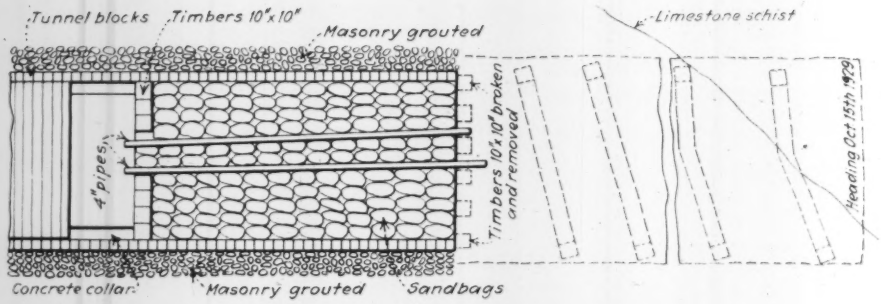


Fig. 5—Sketch of north heading bulkhead

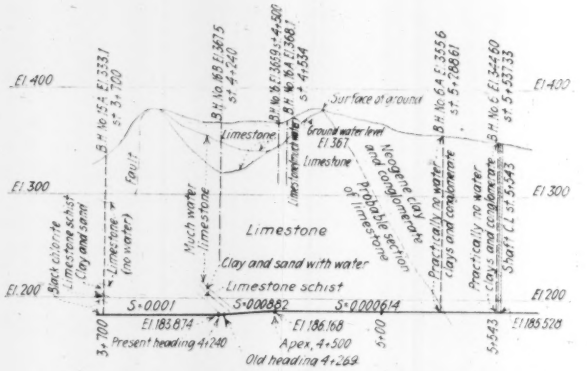


Fig. 6—Profile at water-bearing area

Change of Plan Adopted

The diversion of the tunnel to either one side or the other of the old line was proposed. This had been proposed before, of course, the diversion to take place farther back, as it was argued that a new tunnel could be driven more economically than re-excavating the old.

The most important considerations were the great distance to the heading—about 14,760 ft.; the fact that there appeared to be no chance of avoiding the water-bearing strata; the great weight of the ground, making it impossible to place the masonry lining without relieving the pressure; and the fact that the tunnel was built on such a flat grade that in one section about 16 gal. per second was the maximum amount of water that could be handled. The remote location of the work also was a great disadvantage in obtaining any equipment of a special character.

Fig. 4—Wrecked condition of re-excavated heading

In arguing the question whether it was better to attack the water-bearing limestone from the south rather than the north, it was pointed out that in coming from the north the limestone was all overhead, and before reaching it one would have to pass through an indefinite amount of unstable material in the crushed zone. From the south the water would be approached from the top, and the recent stable formations were supposed to be in close contact with the actual water-bearing limestones. On the other hand, the south portal heading was still far away, the grades in the tunnel were just as flat as in the north portal heading, and the distance to the heading would be nearly 5 miles.

As a solution of the problem it was then proposed to abandon temporarily the north portal heading, sink a shaft at the site of borehole 6 (Fig. 6) and drive a heading at first to the south only, to meet the south portal heading, then remove all equipment and entirely clean up the tunnel between the shaft and the south portal.

On April 2, 1930, the heading south from the shaft was holed through to the south portal heading without any special trouble. Immediately thereafter the heading was started to the north. On account of the large size

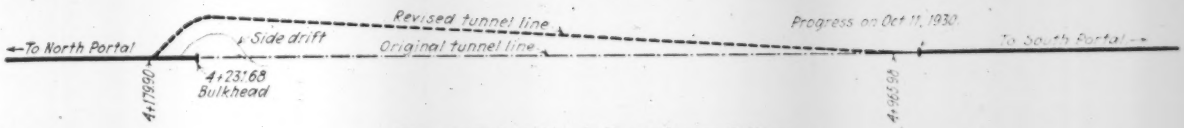


Fig. 7—Original and diverted tunnel lines

of the heading and as a measure of safety, an advance drift was carried in front of the main heading; it was 4 ft. wide by 6 ft. high, and its bottom coincided with the bottom of the tunnel. It was lined with square sets of 6x6-in. timber set one against the other. This drift was carried as much as 26 ft. in advance of the main heading. The timbers at the back end of the drift served as a support for the timbers bracing the enlarged excavation and as a working platform for men carrying on the enlargement work. This work was carried on very cautiously. Exploratory holes were drilled every day or so to a distance of 23 ft. beyond the end of the drift.

Finally water under great pressure was struck in one of the test holes. Other holes were drilled, making seven in all, and water gushed from all of them. The water level in borehole 6A, still 328 ft. away, dropped rapidly, as did also (but much more slowly) the level in the boreholes around the old abandoned heading. Hopes were high that the water at that point would soon be drawn down to a reasonable level so that work could be resumed. After the first rush of water the amount dropped to a steady 6 gal. per second, and after a week or so the water in borehole 6A was down practically to tunnel level, and the advance of the heading was resumed.

A further advance of 7 ft. revealed that the water all came from crevices in badly fractured but re-cemented hard gray limestone, which turned out to be mostly self-supporting. The water level continued to fall slowly at the distant boreholes, and it seemed only a matter of advancing farther to tap off much larger quantities and hasten the process.

This formation extended, however, only a short distance beyond borehole 6A and developed but little more water. Then ensued a rapid and bewildering series of formations, until finally the familiar black chlorite of the north heading was struck. The ground was very heavy and the progress slow. It was found that the 6-in. timbers were not strong enough, so that the drift was made shorter in order not to allow so much time for the pressures to develop.

During this time the water levels over the old heading were going down so slowly that it would have taken several years to get down to tunnel level. Something had to be done to drain off the water.

Drainage Drifts Started

The plan decided on was to go into the old north portal heading again and at a point some distance back of the bulkhead drive a drift off diagonally and curve it around at a safe distance parallel to the old heading. The purpose was to find and tap the water.

The route of the curved drift is shown by Fig. 7. At the end it was taking about 5½ gal. of water per second. This was not enough. It was then decided to start a back drift straight for the old north heading.

The drift was advanced in one week to 16½ ft. from the old heading without sign of water. At this time at a point 13 ft. back of the face, water began to shower down between the timbers in rapidly increasing quantities. The men left hastily and began to put in stoplogs at a previously prepared bulkhead location in the drift. This was only partly finished when the men were driven out. They then began on the same kind of a bulkhead at the entrance to the drift but again did not finish. The back-drift timbers collapsed, letting in a lot of muck that was rapidly washed down the drift and into the main tunnel.

Another bulkhead with prepared timbers was started a few meters downstream in the main tunnel. This was built up to 5 ft. high before the men were driven out. The water at this point was then waist deep, and all the men made for the portal 2¾ miles away.

The tunnel being flat, the water breaking in at 9:30 a.m. did not reach the portal until 12:50 p.m. I estimate the maximum flow at the heading at not less than 1 cu.m. per second and at the portal 92½ gal. per second. After the first rush the flow rapidly decreased, and in the afternoon the heading was visited by a wading party. The next day the flow was down to 26½ gal. and transportation was barely possible.

Altogether, from Sept. 24 to Oct. 15, there were no less than twelve sudden inrushes of water, all of which brought down more or less muck. Of the later flows the largest was 56 gal. a second at the portal. The drift was substantially wrecked.

A Detour Line Adopted

By this time it was quite evident to everyone that the course of the tunnel should be diverted, as there now seemed to be no good reason for attempting to stick to the old line. A proposal to this effect was made to the government, providing for a maximum diversion from the old line of about 131 ft. This was approved and the diversion started on Oct. 18.

As illustrating the mixed character of the geology, this diverted heading never ran into water-bearing formations. The shaft heading, on the other hand, ran into cavernous limestone, but the pressure had been so reduced that no trouble was caused.

It only remains to be said that the two headings were holed through on Feb. 9, 1931, the tunnel having been officially begun on Aug. 30, 1926.

Large Increase in Acreage of Tree Planting by Forest Service

More than 21,000 acres was planted to trees in the national forests in the calendar year 1930, according to a compilation of field reports just completed at the Washington headquarters of the U. S. Forest Service. National forest acreage planted has been increased gradually from the low point of 5,500 acres in 1921, as the result of small increases in funds made available by Congress and of improvements in planting technique. Forest officers believe that 25,000 acres is not too much to expect for 1931. Larger-scale operations and improved methods have made possible reduction in the unit cost of planting. With increases in funds amounting to approximately 100 per cent, the Forest Service has been able to increase the annual planting acreage by nearly 400 per cent.

FROM JOB AND OFFICE

Hints That Cut Cost and Time for the Contractor and Engineer

K-Type Trusses Selected for 225-Ft. Highway Bridge

By PAUL ANDERSEN
Designer of Bridges, Arkansas State Highway Department, Little Rock, Ark.

IN DESIGNING two 225-ft. trusses for a highway bridge over the Sulphur River in Miller County, Ark., the K-arrangement of web members shown in Fig. 1a was considered preferable to the more commonly used Baltimore truss (Fig. 1b), which would require the

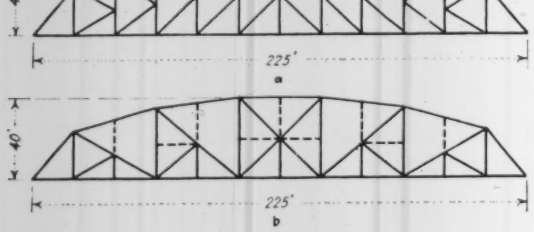


Fig. 1—Truss types studied for Sulphur River bridge

secondary members indicated by the dotted lines to reduce the slenderness ratio of top chord and verticals. Unless the connections of these secondary members to main members are field reamed and riveted after the total dead load has been applied, which means added cost, they will cause the main members to deflect out of line and thus increase secondary stresses considerably. The K-arrangement of web members, on the other hand, makes possible the use of short panels, provides a connection on each vertical midway between top and bottom chord, and thus completely eliminates secondary members. With a panel length equal to one-half the depth, an analysis of web stresses shows a small saving of weight over web members in a similar Pratt-truss arrangement.

Another good feature of the K-truss is the closeness of the bottom-chord splices to panel points. When the lower diagonals slope toward the center of the truss it is possible to place these splices, which for ease in erection and other reasons should be outside the gusset plate on the side having the smaller stress, closer to the panel points than when the diagonals slope toward the support.

The Sulphur River bridge has a reinforced-concrete roadway 24 ft. wide and is designed for an H15 loading. Top and bottom chords are made up of 15-in. channels with flanges turned in on the top chord and out on the bottom. This gives the very compact and rigid end connection shown in Fig. 2, which also shows a special cast-steel rocker that will allow a 2-ft. horizontal movement of the abutments without damage to the superstructure. The bridge was designed by the Arkansas state highway department, of which N. B. Garver is bridge engineer. Structural steel was fabricated at the Memphis plant of the Virginia Bridge & Iron Co. and was erected by Kochtitzky & Johnson, of Forrest City, Ark.

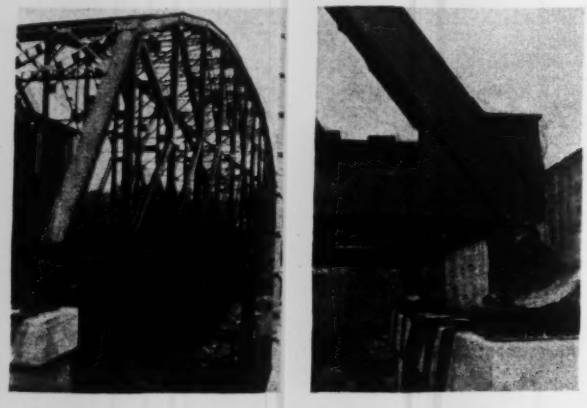


Fig. 2—Completed span and view of expansion end

Planimeter Used to Test Weight of Sheet-Metal Coating

By C. W. BETZ
Chief Chemist, Bureau of Tests and Specifications, Allegheny County Department of Public Works, Pittsburgh, Pa.

THE planimeter, a familiar instrument in the drafting room or engineering office, may seem somewhat out of place in a chemical laboratory. However, where weight of coating determinations on roofing sheets, culvert pipe and other sheet-metal products are being run the chemist may find it a very useful tool with which to determine areas. This is especially so where the test piece is of irregular shape, as it is apt to be in the case of corrugated pipe.

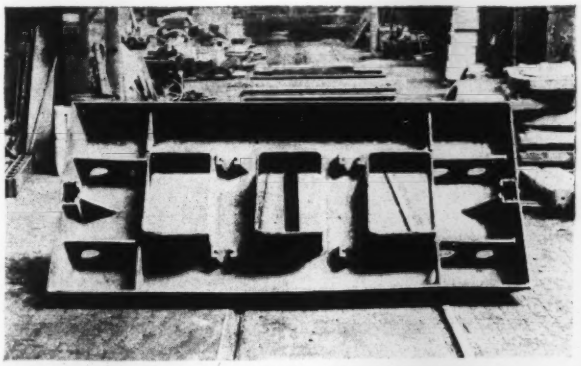
It is common practice in large plants and laboratories to submit for test a square of metal that measures exactly 2¼ in. on each side, giving an area of 6.025 sq.in. With such a sample the loss of weight in grams is numerically equal to the coating weight in ounces per square foot. This method is preferable when a square of exact dimension is easily obtainable by using a die stamp or power shears. When such machines are not available (and this is the case in many instances) it is doubtful whether the time consumed in tedious milling, cutting and filing to exact dimensions is justified.

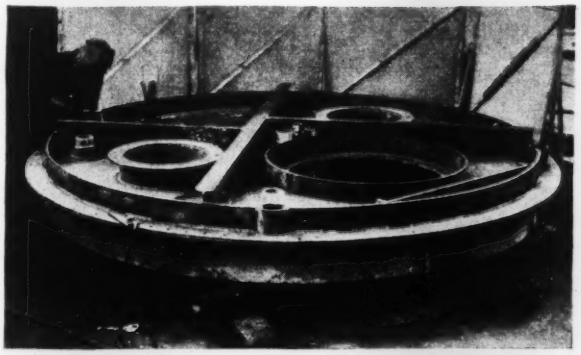
When the test piece is cut from corrugated pipe the problem becomes still more difficult, and it is in this connection that the laboratory of the Allegheny County bureau of tests and specifications has adopted the use of a planimeter to determine the area of irregular pieces. The test piece is sawed from a corrugated pipe as nearly 2¼ in. square as possible, but no special care need be given to dimensions. The piece is then flattened between two smooth plates in a vise. This will usually result in irregular and curved edges. Some stamping ink is applied with the fingers around the edges of the specimen, and an ink impression is applied to a piece of glazed paper. It is the practice of the laboratory to place the paper on which the impression is

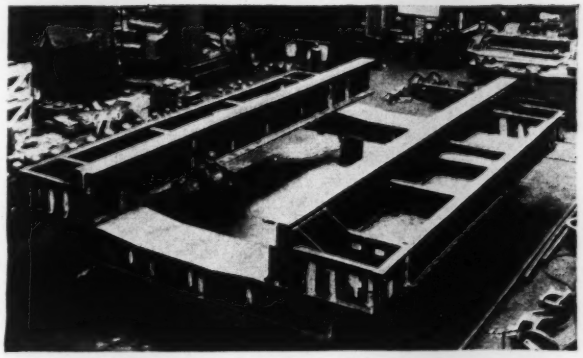
made on a sponge rubber pad, so that a clear-cut impression is obtained. Care must be taken, however, not to puncture or tear the paper, as the ink is likely to run. The planimeter is then employed to determine the area, two or three determinations being made and an average taken. The weight of coating in ounces per square foot is then calculated by proportion, using the standard area of 6.025 sq.in. The method may be used, of course, with flat sheets as well as with corrugated pipe.

Large Welded Units Replace Castings and Riveted Parts

FUSION WELDING applied to the production of large structural elements of machine equipment at the plant of the Wellman Engineering Co., Cleveland, is invading extensively the field of iron and steel castings and riveted assemblages. Three examples are a bed plate for a reversing gas valve, formerly an iron casting; the top plate for a mechanical gas producer, formerly a steel casting; and the frame of a heavy open-hearth charging machine, formerly a riveted assemblage.







Some recent large welded assemblages

Bed plate for 24-in. reversing gas valve for steel furnaces; cover plate for mechanical gas producer; and frame for open-hearth charging machine.

Trough-shaped bases for reversing valves (controlling flow of air and gas to a steel furnace and from the furnace to the chimney) are formed of a $\frac{5}{8}$-in. steel plate, notched at the corners, the sides bent up and welded at the junction angle, and the port frames and bearings welded in. The construction of gas-producer heads and charging-machine frames is evident from the views. Three charging machines with welded frames have been in operation at the Homestead works of the Carnegie Steel Co. for more than a year, giving satisfactory service.

Aerial Maps Aid Parkway Construction

By L. D. BELL

Landscape Division, Long Island State Park Commission, Babylon, N. Y.

AERIAL topographic maps have proved their value in planning the Long Island state parkway. Pictorial maps of the area traversed by this improvement, prepared to a scale of 1 in. = 400 ft., were first used in selecting an alignment harmonizing with the natural beauty of the territory traversed. An approximate location for the center line, drawn on the map with a very soft pencil, could easily be erased when it was necessary to shift the location. Property boundaries were plotted from deed descriptions or available land-survey maps, being oriented from some easily distinguished feature such as a highway or hedgerow. The maps were also of great assistance in the acquisition of rights-of-way by giving the property owner a true picture of the effect which the parkway would produce on adjacent land.

After a section of the parkway was definitely established and a right-of-way had been acquired from a property owner, it was recorded on the map with watercolor, the right-of-way being indicated by green, and property lines and the names of the owners in red. Using this system of symbols makes the map not only a valuable aid in planning the location, but also a progress chart showing at a glance the status of the improvement. When construction was started the same map was used to show the progress of the work, the limits of the various contracts and the location of materials and field offices, using a different set of symbols.

Aerial Tramway Handles Spoil

AN AERIAL cable tramway with cars riding on track cables, instead of being suspended, has been installed to replace a railway and dump cars for handling the overburden of a clay deposit of the Georgia Kaolin Co. at Dry Branch, Ga. The material is a sticky gumbo or sandy loam, and sliding of the spoil bank caused continual trouble in maintaining tracks. With the new equipment, cars from the power shovel now operate only in the pit and dump into a central hopper directly over the loading terminal of the tramway. Owing to the sticky character of the material a special automatic and electrically operated batch-measuring device was applied for charging the continuously moving tramcars, which are of $\frac{3}{4}$-cu.yd. capacity. Each car has four small wheels riding on a pair of stationary track cables and is

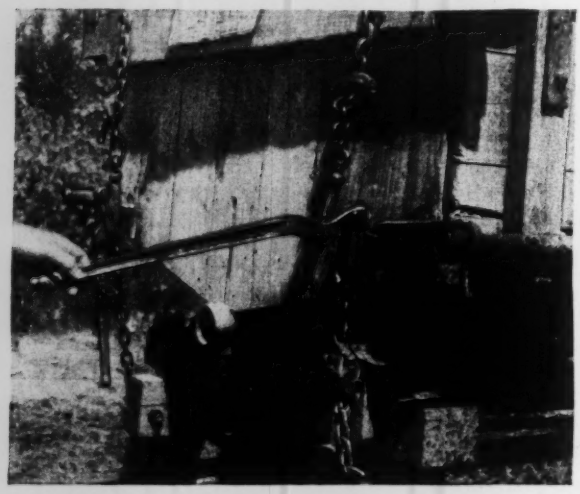
permanently attached to an endless-traction cable driven by an electric motor. There are two sets of track cables, one above the other, and at the discharge end of the line the cars dump by tipping over endwise as they transfer to the return line, on which they travel in inverted position. The discharge end is carried by a 60-ft. tower,

Wheeled dump cars ride track cables
Empty cars in inverted position on lower cables.

and a stream of water causes the material to spread and flow into a ravine. This tramway, with a capacity of 200 cu.yd. per hour, is ½ mile long and has a 22-deg. incline at the pit, which is 20 to 50 ft. deep. It was built by the Interstate Equipment Corp., New York, N. Y., which also designed the special loading device.

Simple Side-Dump Truck Body

SIMPLE home-made 1¼-ton side-dump truck bodies were used to haul in concrete aggregate for the San Antonio 30-m.g.d. activated-sludge plant, recently completed. (See *Engineering News-Record*, Dec. 4, 1930, p. 886). Each body was balanced on a pipe running lengthways of a timber frame on the chassis of the truck,



Dump-truck body balanced on pipe

held by toggle chains, locally called "boomers," on either side at the rear, as shown in the accompanying illustration. The truck box bottom is flat so as to dump clean. Side boards are hinged at the top and secured shut by means of a pipe hooked at each end. J. DePuy, San Antonio, was the contractor.

LETTERS TO THE EDITOR

Secondary Roads Encourage Paved Roads

Sir—I do not at all feel the alarm which seems to be sounded by the writer of the editorial "Prepare for Change" (*ENR*, May 7, 1931, p. 753). The change in Pennsylvania and North Carolina toward a larger state system and the building of a cheaper type of road surface is to my mind inevitable. There are many states where the improvement of the state system has gone ahead rapidly and efficiently with very little thought as to the feeder roads. The people living on these back roads purchase automobiles the same as other folks but have found themselves for many months in the year very much handicapped in comparison with those fortunate enough to live on the main improved roads. Their automobiles have been of no service to them on account of the absence of roads on which they could be used. It is natural, therefore, that they should demand at least an all-weather road.

What is happening in North Carolina and Pennsylvania has happened in other places and will continue to happen in still others—and for the same reasons. Contrary to what might be naturally expected, it does not generally result in a reduction in funds for hard-surface pavements. On the contrary, it has and will result in cultivating a demand for more pavements, and at the same time will build up a healthy good will for more revenue for good roads. Those who live on mud roads are at first ambitious to get out of the mud. They are finally given a cheap traffic-bound road of stone, gravel or some local material, which enables them to use their automobiles at all seasons of the year. This is all right for a year or so. Then they begin to complain about the dust.

I recall the campaign slogan of a certain governor who referred to a predecessor as having pulled the people out of the mud, and he promised to take them out of the dust. This latter demand is met by various bituminous materials used in the numerous ways that have been developed in recent years.

But this is only a step in the natural evolution of the thing. Very soon the very people who were satisfied to get out of the mud a few years back begin to ask why they can't have hard-surface pavements like the pavements on other main roads.

I can cite you a number of examples in my own state, Ohio, where over a period of only six or seven years the transition from mud roads to pavements has been made in this way. If an effort had been made to build a hard-surface pavement in the first instance on these roads, the people would have been opposed to it on account of high cost, and to have forced it on them would have been unwise. However, today they do have the hard-surface pavement and are willing to raise the taxes necessary to pay for it. I do not believe that this good will on the part of any community in supporting revenues for good roads could be obtained more quickly nor that high-class pavements could be sold to them in any more satisfactory way.

What has happened in other places will happen in North Carolina and Pennsylvania. The building of a cheap type of road on back roads will create a demand for better roads and at the same time cultivate the public opinion that will support the revenue measures, which after all are the prime necessity for building roads.

There is one danger in connection with this building of cheap roads in so far as it affects the economical expenditure of public funds. This is the tendency to do this work by direct labor, building up an organization requiring large expenditure for public-owned equipment with all the inefficiencies that are inseparable from government in business.

Personally I am not alarmed at the building of a cheap type of pavement on back roads, for I think it is the best way to create a demand for something better. The danger lies in unbusinesslike and bureaucratic methods of operation.

Washington, D. C.,
June 3, 1931.

HARRY J. KIRK,
Assistant Manager, Engineering Construction Divisions, Associated General Contractors.

NEWS OF THE WEEK

Mount Hope Toll Bridge Goes Into Receivership

Because of default in the payment of interest on its $1,300,000 25-year 7 per cent debenture bonds, the Mount Hope Bridge Co., owner of the Mount Hope toll bridge, spanning the strait between Mount Hope and Narragansett bay, R. I., has gone into receivership. The superior court in Providence on June 2 named R. F. Haffenreffer, of Bristol and Fall River, temporary receiver. The bridge was opened on Oct. 24, 1929, after it had been dismantled and rebuilt because of breaks in the wires in the main cables. The capitalization of the bridge company consists of $2,850,000 first mortgage bonds, bearing interest at 6½ per cent, $1,300,000 25-year 7 per cent debenture bonds, $100,000 7 per cent cumulative preferred stock and $50,000 shares of common stock, no par value.

Bridge Plans at New York Again Disapproved

Bridge clearances of less than 200 ft. over the Hudson River at 57th St., New York, again met with disapproval when the secretary of war, on June 9, passed upon a new application of the North River Bridge Co. for a permit to build a bridge at that point. The revised plans of the bridge company called for a center clearance of 179.8 ft. and pierhead clearances of 154.3 ft., instead of 184.8 and 160.6 as called for in an earlier application.

Two years ago the war department announced that it would not approve of bridge clearances of less than 200 ft. at the center and 185 ft. at the pierhead line (*ENR*, June 6, 1929, p. 920), but in May last year the department authorized the army engineers to reopen the case to consider changes in the clearances originally proposed by the bridge company (*ENR*, May 15, 1930, p. 821). The present decision is the outcome of the reopened hearing.

Chicago Subway Advisory Board Put on Per Diem Basis

The Advisory Subway Engineering Commission of Chicago, which has been on a fixed fee basis since its appointment last July, has been transferred to a per diem basis, the members to be paid only for time devoted to the subway work when called in by the board of local improvements.

Robert Ridgway, chief engineer of the board of transportation of New York City, who has been serving as the head of the commission, some time ago asked to be placed on a per diem basis because of the lessening of his duties. Late in May the president of the board of local improvements decided to put the entire commission on the same basis. The saving estimated to be brought about by this change in the status of the commission and the reduction of its engineering and clerical force is placed at $28,000 per month.

Buffalo Considering Riverfront Straightening Plan

Preliminary plans for straightening the riverfront of Buffalo, N. Y., from Seneca St. to the city line, and for the erection of a bridge over the stream at South Ogden St., have been forwarded by city officials to the war department for approval. To carry out the improvement, the city will have to spend $1,000,000.

Sewer Bond Issue Fails in Los Angeles

A proposed bond issue of $6,000,000 for construction of additional relief sewer lines and treatment and disposal plants for the city of Los Angeles was rejected by voters at a municipal election June 2. The vote, which lacked the required two-thirds majority for passage, was: yes, 88,581; no, 74,838.

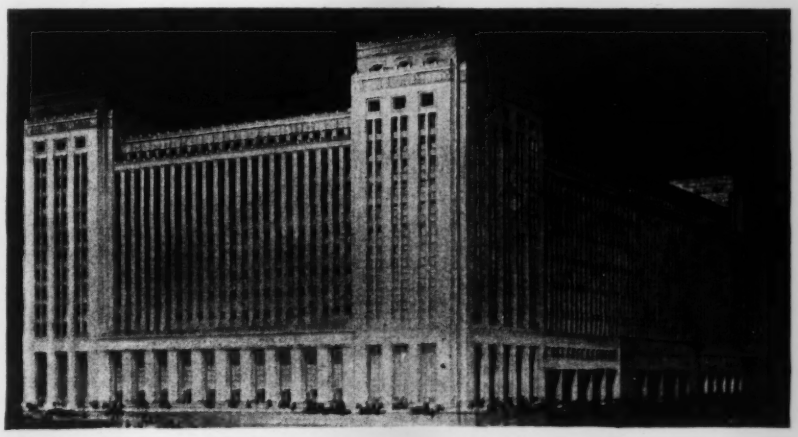
Suspension Bridge Collapse Fatal to 15 Persons in France

During a combined dedicatory and test demonstration of a new 250-ft. span suspension bridge in the south of France on June 3 the structure collapsed, dropping nine or ten trucks (loaded with sand and gravel to provide a live-load test) and a number of spectators into the Isle River, a tributary of the Dordogne.

Fifteen persons lost their lives, including either the builder, Leine Kugel, or his son (dispatches are contradictory); about forty other persons were injured. The bridge is located at St. Denis de Pile, near Libourne, about 15 miles east of Bordeaux. It was being built under the supervision of the department of public works and was state owned.

Special dispatches from the Paris office of the McGraw-Hill Publishing Co. state that it has been informed that the accident occurred when a test truck crashed into one of the forged-steel-rod suspender members on the upstream side of the bridge. This caused the successive failure of other suspenders, dropping the reinforced-concrete floor into 10 ft. of water in the river 25 ft. below. Excessive vibration under the test load is said to have been noted before the bridge failed.

According to these same special dispatches, the bridge had a main suspended span of 250 ft. and apparently



CHICAGO'S $30,000,000 POST OFFICE

The largest post-office building in the world is the record claimed for the new Chicago post office, contracts for which are to be let this summer. It will be 800x350 ft. in plan, between Van Buren, Harrison and Canal Sts. and the Chicago River, with nine 19-ft. stories at the rear and twelve stories in front, giving a height of 200 ft. It is an air-rights development, the site being over the tracks of the south approach to the Union Station. Equipment features, as designed by the engineering and research division of the U. S. Post Office Department, include 18 freight elevators 8x17 ft., 22 passenger elevators, 14 miles of belt conveyors and numerous inclined or spiral chute conveyors. This post office will cost nearly $30,000,000. The architects are Graham, Anderson, Probst & White, Chicago.

no side spans. The forged-steel-rod suspenders were spaced 12½ ft. apart. The bridge was 25 ft. wide. Steel towers were used, and the dispatch states that the eight steel main cables were anchored in concrete blocks.

If the statement that there were eight main cables be true, it is possible that the bridge was of the so-called Fidler-truss type, in which the suspension member consists of two cables intersecting at the center and braced apart between the center of the span and the towers to form trusses. In practice, the cables do not actually intersect at the center, but are cut and attached to a clevis plate, making four cables on each side, or eight cables in all. Each suspension member is hinged at the center of the span (by virtue of the clevis plate) and at the tower tops, forming in principle an inverted three-hinged arch. If the curve of the bottom chord is made such that the equilibrian polygon will fall near the center of the truss under all conditions of loading, both chords will always be in tension and could therefore consist of wire cables. No bridge of this type has been built in this country, although the old Point Bridge at Pittsburgh was of this general design using an eyebar top chord and a built-up bottom chord that could take either tension or compression.

To lend credence to the assumption that the French bridge was of the Fidler-truss type it is known that the firm of G. Liene Kugel le Coq, the builder of the failed bridge, has built several short span suspension bridges of this general design. In the bridges that have been built the vertical members of the trusses have been made up of four 2-in. angles latticed. Wire rope diagonal members are used in each panel, and the roadway is suspended from the lower chords of the trusses by means of forked rods which are pinned to the cable bands.

Work to Be Resumed on Power Project in Alaska

Work will be resumed this month by the Portland Canal Power Co., of Seattle, Wash., on its hydro-electric power project in southeastern Alaska, according to Willis T. Batcheller, president. An engineering and surveying crew of 25 men will be sent to the job, and officers of the company say that plans for the proposed $3,000,000 project will be completed and bids called for early in July.

Initial work will consist of the main and diversion tunnels. The main bore will be 1,600 ft. long and will have a concrete-lined diameter of 16 ft. The diversion tunnel will be unlined with a length of 600 ft. and diameter of 10 ft. A penstock 500 ft. long with a 10-ft. opening at the upper end, tapering to 8 ft. at the lower end, with two 6-ft. branches running to the two turbines, is planned. Initial output of the plant will be 10,000 hp. with ultimate capacity of 40,000 hp.

Charles F. Goob Resigns as Baltimore's Chief Engineer

Charles F. Goob, chief engineer of Baltimore since 1927, has resigned that post, effective July 1. Bernard L. Crozier, who formerly held the office, has been appointed in his place and will assume his duties on June 15. Mr. Goob will be on vacation from June 15 to July 1. The appointment of Mr. Crozier was made by Mayor Jackson, who took office recently, and followed announcement that Mr. Goob had resigned. The latter's term of office would expire in October. He plans to engage in private engineering work in Baltimore.

Mr. Crozier was a member of the engineering staff of the old city paving commission, and when Mayor Jackson was elected for his first term in 1923 he was appointed highways engineer. Later he was promoted to be chief engineer. He was succeeded by Mr. Goob when Mayor Broening took office in 1927. Upon leaving the municipal service Mr. Crozier became chief engineer of the Metropolitan District Commission of Baltimore County, an office he now holds.

Mr. Goob entered the engineering department of the city in 1919, when, in Mayor Broening's first administration, he was made head of the old electrical department. He also served as highways engineer. When the reorganization of city departments was effected he became head of the bureau of mechanical-electrical service. When Mayor Broening returned to office Mr. Goob was made chief engineer.

Central Mortgage Bank Proposed

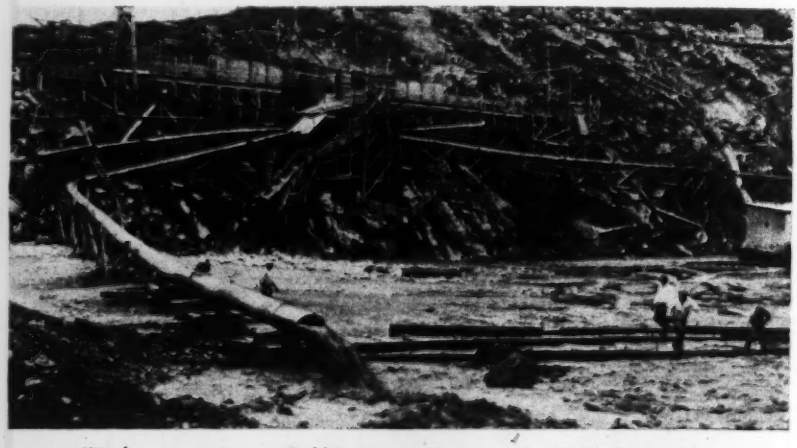
Preliminary action looking toward the establishment of a central mortgage bank to facilitate the financing of residential construction was taken by the National Association of Real Estate Boards at its convention at Baltimore during the last week in May. The United States is the only major country that does not now have such a system.

The proposed mortgage banking system would provide a channel through which, without changing the existing machinery of mortgage lending, funds will flow from large sources of capital direct to the private individual who wants to borrow to buy or build a home. It will provide some place where mortgages on individual residences can be sold or discounted, either permanently or temporarily, whichever the mortgage holder desires. This would make a mortgage a liquid instead of a frozen asset, thus reducing interest rates and facilitating residential construction.

10,000 Cu.Yd. Fill Sluiced Daily Into Cobble Mountain Dam

Two shifts daily are each averaging 5,000 cu.yd. of hydraulic fill at Cobble Mountain Dam, being built by the city of Springfield, Mass., for water supply and power on Little River 8 miles above Westfield. The dam, being built by the full hydraulic method, will be the highest earth dam in the world, rising 250 ft. about its rock foundation. Fill material is excavated in borrowpits about a mile above the dam, brought to the dissolving box, shown on the far hillside in the accompanying illustration, in ten-car trains and sluiced through a 20-in. pipe into the dam. A 14,000-g.p.m. pump supplies the sluicing water. About 900,000 cu.yd. out of a total of 1,383,000 cu.yd. of hydraulic fill has been placed to date. A total of 376,000 cu.yd. of rockfill is required, most of which is in the diversion dam at the upstream toe of the main dam. About 86,000 cu.yd. of rock remains to be placed, all of which goes into blankets on both slopes of the earthfill. Power rights of the project have been leased to the Turner's Falls Power Co. A three-unit power house and a pressure tunnel 7,700 ft. long have been completed. The entire project will be finished this fall.

S. J. Groves & Sons, Inc., Minneapolis, is contractor on the dam. E. E. Lochridge is chief engineer of the Springfield board of water supply, and H. H. Hatch is division engineer in charge of the project.



Work progressing on Cobble Mountain Dam near Springfield, Mass.

Additions Planned to Los Angeles Power System

Preliminary plans for the addition of both steam and hydro-electric generating facilities to the Los Angeles, Calif., municipal power system are being made under the direction of H. A. Van Norman, general manager and chief engineer of the department of water and power. The city's board of water and power commissioners recently adopted resolutions ordering a study and report on the proposed additions, which would include an 80,000-hp. steam plant and the addition of 20,500 hp. of hydro capacity at Power Plant No. 2 in San Francisquito Canyon. The city has no steam plant at present. The present capacity of Power Plant No. 2, which is one of five hydro plants, is 41,800 hp. The tentative location of the proposed steam plant is at tidewater at Wilmington, in city territory. The plans under consideration contemplate the financing of the plant out of revenues, the purchase of materials and equipment to be made on the installment plan. The financing of the proposed additional hydro unit would be done in the same manner.

Chicago Tax Troubles

Little progress has been made in the last year toward clarification of the Chicago and Cook County tax muddle. In the meantime citizens have declared a strike against paying taxes, and the situation is now critically bad. Of the 1928 tax total 16 per cent remains unpaid; of the 1929 total 42 per cent. The 1930 bills have not yet been sent out; in fact, the valuation of property on which these 1930 taxes are assessed has not been completed. However, the city council has made its own levy against the 1931 assessment and, by law, is permitted for current revenue to sell tax anticipation warrants up to 75 per cent of the expected proceeds.

Chicago banks have refused to take the latest anticipation warrants. First they insist that previously issued warrants be paid. With only 58 per cent of the 1929 taxes received, obviously 75 per cent cannot be paid out. Then the bankers want remedial tax legislation, simplifying and unifying the procedure under a single head. Outside bankers for a $20,000,000 loan may come to the rescue.

A combination of circumstances has produced the crisis. Some of the causes are as follows. The delay in making a reassessment involved a lapse of two years during which no one paid any taxes. The financial depression and unemployment swept away money saved for taxes. The small equities in real estate have been wiped out in numerous cases.

All these elements have produced a muddle for which numerous remedies have been proposed. The state legislature has more than a hundred bills relating to taxes before it. The newly elected mayor has pleaded with the legislators for passage of some of the more vital bills but with no success so far. It is pointed out, however, that there is still time before adjournment for some relief.

Of immediate concern for the seven local governments that look to Cook County for money is the finding that $8,000,000 interest and bond money will be due July 1. Some $20,000,000 must be found during the year. Cook County was erroneously reported recently as defaulting June 1 on $1,900,000, but the banks took care of the obligation, saving the credit-smashing aftermath so well known to bond dealers.

The price that is paid by Chicago, the school board, the Sanitary District and the park boards is appalling. Credit is at low ebb. While New York pays 1¾ per cent and some New England cities 1½ per cent for short term money, Chicago warrants not only bear 6 per cent, but sell at a material discount, and oftentimes a bankers' commission must be paid in addition. From 10 to 12 per cent is frequently exacted. The paper bears no due date is the reason.

The reflection on Chicago business is not inconsiderable and its business leaders are now fully awake and in cooperation with the officials, who at last seem to have sensed the seriousness of the situation.

Hoover Dam Notes

Work done in connection with the Hoover Dam project during the week ended June 3 includes the following:

Tests of washed and unwashed materials entering into concrete are under way at the Las Vegas laboratory. A refrigeration machine will be used to control the curing temperatures of test specimens. Eighteen resistance thermometers were placed in rock holes in the Nevada and Arizona canyon walls. To provide additional room for the concrete tests in Denver a one-story building has been leased.

Studies of the spillways are practically complete, except for tests of models now being conducted at Fort Collins and on the Uncompahgre project. The test at Fort Collins will be on one-sixtieth scale, while those on the Uncompahgre project will be on a one-twentieth scale. Final designs for the trashrack for the inner diversion tunnel on the Arizona side were started. Equipment for experiental tests of lowering the concrete bulkheads for the outer tunnels by sand jacks are being designed.

One of the large dormitories in Boulder City is being inclosed, the office building is nearly completed, and the office dormitory already is in use. Work is in progress on the mess-hall and on a second dormitory.

The camp for 400 men at Cape Horn was occupied June 1 and the tent camp has been abandoned.

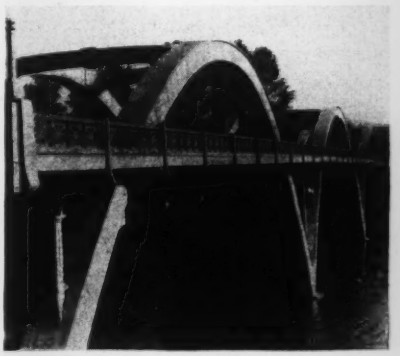
The first large diesel power compressor plant has been placed in service. The pipe line to the adits at the dam site is being constructed. Three suspension bridges for foot passage have been built across the river.

About 4 miles of the Boulder City-Hoover Dam highway are completed. Difficulty is being experienced in the heavy cuts above Tunnel Ridge.

Work is being pushed on the building of a highway and railroad grade between the mouth of Heminway Wash above the dam and the Nevada diversion tunnels. At present rough grading is nearly complete up to the inlets of the tunnels except where it is necessary to make heavy cuts. The grade for the road connecting the government highway with the outlets of the Nevada tunnels has progressed to a point above the intake for the Boulder City water supply. A considerable part of the Nevada sector of the Black Canyon highway has been shot. All arrangements have been made to push that work rapidly.

Street plans for Boulder City are complete and bids will soon be taken for sewer and water installations, walks and street paving. Advertisements will be issued June 15 for the construction of the administration, dormitory and municipal buildings, to be ready for occupancy Nov. 1.

With the object of encouraging safety measures during construction, at least six honorary fellowships in the Florence Nightingale Institute of Honorables will be conferred upon foremen each year whose records show the least number of fatal accidents. Perry W. Weidner, of Los Angeles, president of the institute, announced the plan. The safety fellowships will be designated as "The Edward Sheibley awards for conservation of human life at Hoover Dam." Mr. Sheibley is a San Francisco civil engineer who has been active in safety work. Foremen who have the best records of life conservation will be given certificates imprinted on parchment.



NEW OREGON HIGHWAY BRIDGE

Grants Pass Bridge, a highway bridge constructed on the Pacific highway over the Rogue River for the Oregon state highway commission, was dedicated May 23. The bridge consists of three 150-ft. arch spans and two 50-ft. approach spans. The arches are the half-through type. The roadway is 27 ft. wide with a 5-ft. sidewalk on each side. John K. Holt, Salem, Ore., was the contractor. The construction of this bridge cost $120,000.

Tri-State Pollution Board Holds Preliminary Meeting

A preliminary meeting was held on June 3 of the commissions appointed by the states of New York, New Jersey and Connecticut to formulate a treaty among the three states and the government of the United States to cover comprehensively all matters relating to the prevention and eradication of the contamination and pollution of natural waterways between the several states and of the natural waterways flowing into them. Joseph P. Day, realtor, of New York City, was chosen chairman.

Congressmen LaGuardia and Black, of New York, were present at the meeting, and predicted that little difficulty would be realized in obtaining the cooperation of Congress.

The next meeting of the commission will be held on June 17.

Bids Called for First Unit of Seattle Water Project

The Mountain Lakes Water Co. has issued a call for bids, until June 30, for the first unit of the $2,000,000 water project planned by the company for construction between the north city limits of Seattle and Everett, Wash. The first unit includes clearing of rights-of-way and sites for reservoirs. The general contract, which will be called later, will include 50 miles of wood stave and steel pipe. The company is a subsidiary of Ulen & Co., of New York.

Commission Returns Revisions to Industry Practice Codes

Eighty trade practice codes were returned last week to the industries that framed them, with the changes proposed by the Federal Trade Commission to forestall possible infractions of the anti-trust laws. The industries whose codes have been revised are disposed to play a waiting game and forbear from presenting their objections until the commission has fully committed itself in completing the revision of all codes, about 125 in number, that have been under its scrutiny. The petroleum code, the revision of which is regarded as a key to the commission's attitude, does not appear on the list of codes which have been referred back.

The industries which received their revised codes last week have 60 days in which to accept them, after which, according to an announcement by the commission, they will become effective in their revised form.

The codes which have been revised and returned to the industries include those relating to common brick, face brick, lime, concrete mixers and pavers, heavy sheet glass, floor, wall and clay tile, metal lath, millwork, plumbers' brass goods, plumbing and heating, structural steel, solid section steel windows, scrap iron and steel, pipe nipples and reinforcing steel.

WASHINGTON NOTES

By PAUL WOOTON
Washington Correspondent

Time Element Considered by Interior Department in Award of Contract for Hospital Unit

BEFORE awarding a contract for the construction of a new unit at one of its hospitals, the interior department has requested the advice of the general accounting office if it can consider the time element in determining the low bidder. The project involves building a two-story tuberculosis annex to St. Elizabeth's Hospital in Washington, for which an appropriation of $240,000 is available.

Although the W. P. Rose Co., of North Carolina, submitted the lowest basic bid of $185,000, the interior department has indicated its desire to award the contract to the Adams Construction Co., of Washington, which agreed in its bid to do the work in 65 days less time than the Rose company. The Adams company bid, $190,980, was the fourth lowest.

As the specifications provided that time of performance would be considered in awarding the contract, the department has assessed the Rose company with a penalty of $80 a day for the difference of 65 days. By adding this penalty of $5,200 to the Rose company's bid and by throwing in one of four alternate bids, the Adams company is made the low bidder by a slight margin.

The matter is watched with unusual interest because of its bearing on the federal construction program. Some protest has been raised against the Rose company by local elements of the building industry in Washington because it has taken school contracts away from local bidders. Complaints were made that an excessive amount of cheap outside labor was imported. Later, two construction supervisors employed by the company were ruled off a school job by a court order as the result of a construction accident in which there was a loss of life. It was held that there was undue negligence and disregard of warnings by building inspectors.

The Business Outlook

Swings of stock-market sentiment are capricious, but they have become crucially important for business recovery because they now control the congealed currents of credit. Current trade statistics are of no special significance save as showing sustained resistance to further radical recessions and an early onset of the usual summer slackness. Commodity price declines continue, and wheat has settled sharply to expected open market levels as Farm Board support is withdrawn and the new crop starts to move. But neither commodity nor security quotations now reflect economic actualities, and rational revaluation is inevitable. Those who recognize this early will not regret it.

—The Business Week, June 10.

Pilot Cut Considered Through Boeuf and Tensas Basins

Substitution of a concrete weir for the fuse plug at the head of the Boeuf basin is being studied by the Mississippi River Commission. In connection with that study consideration is being given the construction of a pilot cut through the Boeuf and Tensas basins. A report will be made on the possibilities of the enlargement of this channel by the action of water passing through it. It is hoped that this report can be made before Congress convenes so that it may be taken up in committee with the other alternate plans that have been reported on previously.

Barge Service to Be Started on Illinois River

While final arrangements are being completed at Peoria for a celebration June 15 marking formal inauguration of barge service on the Illinois River, the Inland Waterways Corp. already is receiving cargo at New Orleans. Three barges are en route to Peoria, and other barges bound for the Illinois River will leave New Orleans within the next few days. The operating report of the barge line for April shows a net income of $34,300 on the Mississippi division, while the income on the Warrior River division was the highest for any month in the history of the service on that river.

Coordinating Washington Highways With State Roads

In cooperation with the National Capital Park and Planning Commission, the Bureau of Public Roads is about to undertake a survey for the purpose of devising a plan for coordinating the highways of the city of Washington with those of the surrounding parts of Maryland and Virginia. Highway bodies of Maryland and Virginia are participating in the survey. Particular attention will be directed to the preparation of plans for fixing the location of extension roads so that they will connect with the most suitable existing highways.

Studying Wave Forces on Atlantic Coast

As the result of recording work now under way along the New Jersey coast, at Portland, Me., and along the Great Lakes by the beach erosion board of the Corps of Engineers, it is expected that extensive information will be made available to engineers concerning wave forces. Wave dynamometers have been installed at the various locations selected and the wave impacts will be recorded on oscillographs especially constructed for this purpose.

Detroit Selected for 1932 Road Show

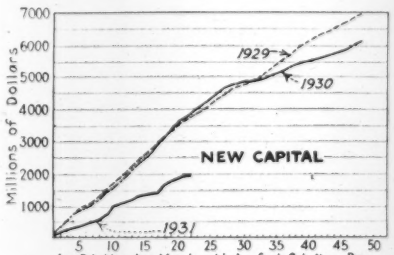
Officers of the American Road Builders' Association have announced that the 29th annual convention and road show will be held in Detroit, Mich., Jan. 9-15, 1932. The Detroit Airport building will provide ample accommodations for both the technical meetings and the exhibitions of equipment. All of the latter will be on the ground floor. A new plan of housing visitors will be followed, calling for grouping city officials in one hotel, county officials in another, and so on through the list of divisions of the association. This is expected to facilitate the location of members by friends.

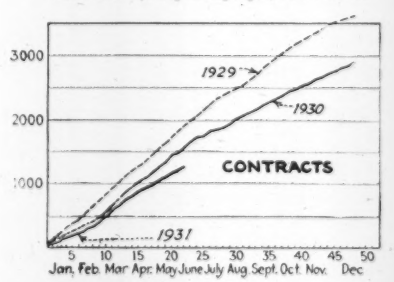
Capital and Contracts

New public and corporation securities issued in the last five months total 1,761 millions. Though this is the smallest volume of the last five years, the public bond component is the largest. It amounts to 41 per cent of the total, or twice the ratio of other years. Common stock issues this year amount only to 7 per cent of total new capital, compared with 24 per cent last year, 43 per cent in 1929 and 11 per cent in 1927 and 1928.

Outstanding among the $23,000,000 of new issues in the first week of June are $5,000,000 West Virginia 3½s and 4¼s for roads, $2,310,000 Albany 3½s for water and other improvements and $2,300,000 Wyoming 4s for highways.

Contracts of the last five months total 1,197 millions, about the same as in 1927. Public-works volume, though the largest on record, is only 10 per cent above last year's figure and 20 per cent above the average of the last five years. Due to the severe slump in building, public construction this year amounts to 57 per cent of total engineering construction, compared with 38 per cent in 1930 and also averaged during the last five years.





COSTS AND CONTRACTS

ENR Index Numbers

Cost			Volume	
June 1, 1931	187.23	May,	1931	251
May 1, 1931	189.33	April,	1931	289
June 1, 1930	203.36	May,	1930	354
Average, 1930	202.85	Average,	1930	260
Average, 1929	207.02	Average,	1929	317
1913	100.00	1913		100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of June 11, with some comparisons, total as follows:

(In Thousands of Dollars)

	June 11, 1931	Average of Last Four Weeks 1931	1930
Buildings:			
Industrial	$2,425	$3,627	$8,630
Other	12,601	16,919	20,609
Streets and roads	13,878	13,503	18,656
Other eng. constr.	10,392	14,747	33,911
Total	$39,296	$48,798	$81,807
Total, all classes, Jan. 1 to June 11:			
1931			$1,292,796
1930			1,708,990

Personal Notes

JAY DOWNER, chief engineer of the Westchester County Park Commission, was honored with the degree of Doctor of Science by Columbia University at its recent commencement.

GILBERT H. FRIEND, formerly special assistant to the chief engineer, Western Maryland Railway, is now civil engineer, Quartermaster Corps, U. S. Army, located at Bolling Field, Washington, D. C.

CHARLES H. MOOREFIELD, state highway engineer of South Carolina, will receive the honorary degree of Doctor of Engineering from the University of South Carolina at the commencement next week.

ARTHUR S. MILINOWSKI, of St. Paul, and FREDERIC BASS, of Minneapolis, have been named by Gov. Olson as members of the Minnesota state board of health. Both are members of the American Society of Civil Engineers.

SOCIETY CALENDAR

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; summer meeting, Tacoma, Wash., July 8-10.

AMERICAN SOCIETY FOR TESTING MATERIALS, Philadelphia; 34th annual meeting, Chicago, June 22-26.

AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS will hold its 25th anniversary meeting at Ames, Iowa, June 22-25. An interesting program of papers and reports has been arranged.

CLAY PRODUCTS INSTITUTE OF AMERICA will hold its second annual meeting on June 22 in Chicago, in connection with the annual meeting of the American Society for Testing Materials. Papers will be read on the various qualities and uses of structural clay products.

INTERNATIONAL ASSOCIATION OF PUBLIC WORKS OFFICIALS will hold its next conference in New York City Sept. 24-26. A. M. Anderson, 100 North LaSalle St., Chicago, Ill., is secretary.

Mr. Milinowski is a consulting engineer and Mr. Bass, as well as being a consulting engineer, is professor of municipal and sanitary engineering in the University of Minnesota.

J. P. H. PERRY, for several years vice-president in charge of the Chicago office of the Turner Construction Co., returned to New York on June 1 to take up the duties of vice-president in charge of estimating, contract negotiations and advertising for the entire company. He continues as vice-president in charge of the Chicago office, but his headquarters will be at the home office in New York City.

GEORGE B. HERINGTON, consulting engineer, of Portland, Ore., has been awarded the honorary degree of Doctor of Engineering by Oregon State College. Mr. Herington is executive secretary of the Portland Chapter, A.G.C.; secretary-manager, Building Construction Employers Association; secretary, Joint Conference and Arbitration Board, and secretary, Professional Engineers of Oregon.

SCHUYLER M. SMITH, assistant bridge engineer for the Wabash Railway for the past several years, has been appointed bridge engineer for the Missouri-Kansas-Texas Lines and will have charge of the completion of the railroad's new $1,200,000 bridge across the Missouri River at Boonville, Mo., and other important bridge work on the Katy system. He fills the vacancy caused by the recent death of R. M. Stubbs.

THOMAS G. PIHLFELDT, consulting bridge engineer of the city of Chicago, has been reappointed to the position of engineer of bridges, which he had held for several years. He replaces Paul Schioler, who held this position under the former administration and has now resigned.

Obituary

SAM HANLEY, city engineer of Renton, Wash., for the past ten years, died in that city recently at the age of 53 years.

HORACE A. MIDDAUGH, of Seattle, Wash., pioneer builder, and founder of the Pioneer Sand & Gravel Co., died at his home in Seattle on May 25, at the age of 64. Mr. Middaugh was for many years connected with the White Pass & Yukon Railroad in Alaska, and with the Northern Pacific Railway Co.

S. EVERETT MASON, of Kenmore, N. Y., former engineer for the Niagara Power Co., committed suicide by shooting May 31 because of despondency over financial reverses. Mr. Mason was 55 years old. For fifteen years he was employed as deputy city engineer at Niagara Falls and in 1915 became assistant chief engineer in charge of grade-crossing elimination in that city. Later he was in charge of power line construction in Niagara and Erie counties for the Niagara Power Co.

Brief News

MORE THAN 300 MILES of all-concrete roads were built in Great Britain during 1930, which constitutes a record for any one year, according to a report received by the U. S. Department of Commerce.

GRADE-SEPARATION PROJECTS, to the number of 75 or 80, all on the state trunk highway system, are planned for construction this year by the Wisconsin highway commission, under the direction of W. C. Buetow, state highway engineer.

A NEW MUNICIPAL WATER SYSTEM has been completed at Flagstaff, Ariz., at an expenditure of $500,000. The new system includes a pipe line from the inner basin of the San Francisco Mountains to the two city reservoirs impounding 100,000,000 gal. of water.

A BILL regulating contracting in Arizona has just been approved by Gov. Hunt. The law establishes the office of registrar of contractors and fixes fees for the registration and licensing of contractors, with penalties for violation of its provisions.

THE NEW $1,000,000 BRIDGE at Trotter's Landing across the Tennessee River, one of the twenty large bridges recently built by the Tennessee state highway department, was opened on May 23.

CANALIZATION of the Trinity River from Fort Worth, Tex., to the mouth of the river is authorized by a bill signed by Gov. Sterling, which will become effective 90 days after the adjournment of the legislature. The measure creates the Trinity River Canal and Conservancy District for the purpose of carrying out the plan.

REPORT on the cost of a new sewage-disposal plant for the city of Toronto has been ordered by the board of control. The survey will be made by Harrison P. Eddy, consulting engineer, of Boston, Mass., and Gore, Nasmith & Storrie, of Toronto. The report will be based on the needs of a city of twice the present population.

THE INTERSTATE COMMERCE COMMISSION has rejected the proposal of Southern rail lines to reduce rates on cast-iron pipe from the Birmingham district to south Atlantic ports for coastwise shipment to Eastern trunk line and New England territories. The commission held that the drastic reductions proposed by the Southern roads would disrupt the rate structure and impair their revenues.

INVESTIGATION into the workmanship on the Cedar River pipe line project, now nearing completion at a contract price of $1,207,116, is being made by City Engineer R. H. Thomson, of Seattle, Wash., and a staff of experts. This is the climax of a series of difficulties between city officials and the Queen City Construction Co., contractor. The company has been involved in several previous complaints, chiefly involving labor disputes on the pipe line job, and the board of public works has adopted a motion recommending that the company be barred from bidding on city contracts for two years should it refuse to comply with the board's recommendations in these wage disputes.

THE FEDERAL POWER COMMISSION has approved the issue of a preliminary permit to the Southern Industries & Utilities, Inc., for a power project on the lower Tennesse River. This project covers the stretch between Pickwick Landing, near the southern boundary of Tennessee, and a point 20 miles above the mouth of the river. The total length of the pool is 190 miles. Terms of the permit require foundation examinations to be completed within one year and the preparation of a complete engineering, economic and financial report. The magnitude of this project may be indicated by its estimated capacity of 94,000 primary horsepower and by the estimated cost of the dam and navigation facilities as $46,000,000.

Wages Are 14 to 27 Per Cent Below the Scale

DIFFERENCE between official rates and wages currently being paid in twenty cities was presented in a table on p. 946 of last week's issue. The present article adds wage data on 25 cities, making a total of 45, and gives more information concerning rates at some of the cities quoted last week. The per cent that actual wages are below the scale is as follows: carpenters, 17; bricklayers, 17; plasterers, 16; ironworkers, 14; common laborers, 27; straight average of the five classes, 18 per cent below official scale. Conditions in many cities are given below.

At Portland, Me., the common labor rate varies from 45c. standard to 38c. per hour for city street department wages, and 55c. to 60c. paid by some contractors. Small contractors are paying much below scale in the Boston district. In Connecticut actual wages are 22 per cent below union; common labor 33 per cent below. Small residence builders are employing at their own figures.

Large Contractors Pay Union Rate

In Albany the larger contractors are paying the union rate, but on a great deal of the work the rate has been cut 15 per cent. The carpenters' union during the last few months has lost 400 of its membership of 1,800. Cement finishers are paid $1.75, the same as bricklayers and plasterers; concrete workers 75c. per hour. In Syracuse the larger contractors pay the rate and the smaller contractors are cutting under. The rate for common laborers is 82½c., but the smaller contractors are paying 40c. to 50c. and some as low as 35c. per hour. In Rochester the rate for common labor is 70c.; 40c. to 50c. in small neighboring towns. In New York City also the general practice holds true; the larger contractors pay the scale while the smaller contractors cut under. Even on steel framework, on which the trade is open shop, all leading contractors pay the scale, which is the same as for bricklayers and plasterers.

Rates in northern New Jersey cities, including Newark, Kearny, Bloomfield and East Orange, are $1.93¾ for bricklayers and plasterers, $1.65 for carpenters, $2 for ironworkers and $1 for union common labor. According to contractors themselves, the scale is being paid, lower rates are not expected, and production by all trades is good. All Trenton contractors are paying the scale, which is $14 per day for carpenters, bricklayers, plasterers and cement finishers, and ironworkers.

Union Rates Hold in Philadelphia

In the Philadelphia area union rates hold on all major construction work. The so-called actual rates given in the accompanying table apply on smaller contracts. Jobs at the regular rates are no more difficult to obtain than those at cut rates. On big work in Pittsburgh the scale is maintained, but on other contracts wages for skilled labor are 70c. up and for common labor 50c. up. A combination strike and lockout is now on between the building trades employers' association and the bridge and structural ironworkers' union. The men have been working 5½ days at $1.50 per hour and now want $1.65 and five days. They also want to handle all ironwork between trucks and the building, some of which work is now done by laborers. Consequently a large amount of building is held up in the Pittsburgh district.

Trend Downward in Many Places

The Richmond figures show a drastic difference between the union rates and those actually being paid, and the trend is down. The same is true for Knoxville. On two sewer contracts under way for the city the specified rate of 30c. per hour is being paid; but on other contracts the rate is as low as 15c., ranging up to 30c. The unions do not control the situation in this city even in normal times, and under present conditions work is being accepted at any rate of pay. Many railroad men have been employed on emergency appropriation work by the city during the winter as common labor at 25c. In Nashville non-union labor is working for any wage, and an example is 20c. per hour up for carpenters, compared with the union rate of 90c. Wage reductions are not expected in Memphis, and increased construction activity is looked for. In Louisville not more than a third of the work is union. On these jobs the union rates hold, but most of the work is being taken by non-union contractors. Large companies from other states are bidding in the biggest jobs at prices far below those of local

OFFICIAL AND ACTUAL WAGES OF BUILDING MECHANICS IN 45 CITIES

	Carpenter		Bricklayer		Plasterer		Ironworker		Common Labor	
	Scale	Paid	Scale	Paid	Scale	Paid	Scale	Paid	Scale	Paid
Akron	$1.15	$1.15	$1.45	$1.45	$1.62½	$1.62½		$1.25		$0.40@0.50
Amarillo	1.12½	0.75	1.50	1.50	1.50	1.50			0.50	0.35
Athens	1.18½	0.70@1.00	1.62½	1.50	1.62½	1.50	1.37½	1.37½		0.30
Atlanta	0.60@0.70	0.40@0.60	1.25@1.40	1.12½	1@1.25	1.00	1.25		0.25@0.35	0.15@0.20
Boston	1.37½	1.37½	1.50	1.50	1.62½	1.62½	1.37½	1.37½	0.80	0.80
Bridgeport	1.00	0.80	1.25	0.90	1.25	1.00	1.75	1.50	0.90	0.60
Butte	1.25	1.25	1.75	1.75	1.75	1.75	1.00	1.00	0.72	0.72
Chicago	1.62½	....	1.70	....	1.70	1.50	1.62½	....	0.97½	0.97½
Cleveland	1.37½	0.85@1.10	1.62½	1.25@1.50	1.62½	0.94	1.50	1.50	0.87½	0.40@0.50
Decatur, Ill	1.10	0.80@1.10	1.50	1.50	1.50	1.50	1.00	....	0.50@0.90	0.40
Indianapolis	1.26	0.98	1.62½	1.30	1.58	1.26	1.45	1.16	0.50	0.40
Madison	1.20	1.12½	1.45	1.40	1.37½	1.40	....	....	0.50@0.60	0.55
Nashville	0.90	....	1.50	....	1.50	....	....	....	....	0.20@0.25
Pittsburgh	1.50	0.70 up	1.75	0.70 up	1.66½	0.70 up	1.50	0.70 up	0.80	0.50
Portland, Me	1.00	....	1.40	....	1.40	....	0.90	....	0.45	0.45@0.55
Sioux City	1.12½	1.12½	1.50	1.50	1.37½	1.37½	....	....	0.35	0.30@0.35
Syracuse	1.32	0.90@1.32	1.65	....	1.65	....	1.50	....	0.82½	0.40@0.82½
Oklahoma City	0.87½	0.60	0.90	0.70	0.80	0.65	0.90	0.90	0.50	0.35
Casper, Wyo	1.12½	1.12½	1.62½	1.50	1.50	1.50	1.00	0.90	....	0.50
Tulsa	1.25	0.75@1.10	1.68¾	1@1.25	1.37½	0.90@1.00	1.25	0.90@1.00	....	0.30@0.40
New York	1.65	1.50	1.92½	1.75	1.92½	1.75	1.92½	1.92½	1.03⅛	0.65@0.70
Durham, N. C	0.75	0.40@0.50	1.00	0.75@0.80	1.25	1.00	....	....	....	0.20@0.30
Phoenix, Ariz	1.00	0.62½@1.00	1.50	1.00@1.50	1.37½	0.75@1.37½	0.62½@0.87½	0.62½@0.87½	0.37½	0.37½
Louisville	1.00	0.60 @0.85	1.50	0.80	1.62½	0.70@0.80	1.25	0.50@0.85	0.35	0.25@0.35
San Antonio	1.12½	0.87½@1.12½	1.62½	1.62½	1.62½	1.50@1.62½	1.25	1.00@1.25	0.40	0.30@0.40
Average, 45 cities	1.15	0.95	1.56	1.30	1.48	1.25	1.33	1.14	0.59	0.43
Below scale		17%		17%		16%		14%		27%

bidders who observe the scale. Following are union and actual rates on some trades additional to those given in the table: boiler maker, union, $1.25, actual, 80@85c.; electrician, $1.31½ and 60@80c.; hoisting engineer, $1.25 and 80c.@$1; sheet-metal worker, $1.10 and 80c.@$1; stone mason, $1.50 and 80c.@$1. In Durham, N. C., there has been no official lowering of the scale, but many union men are accepting lower wages from non-union contractors, and 90 per cent of the building trades mechanics are out of employment.

Severe cutting is to be found also in Birmingham. The union attitude seems to be to meet open-shop competition by all means commensurate with the preservation of membership and rules. Local correspondent states that bond issues floated to make work for unemployed are probably the principal agencies responsible for scale reductions in the larger cities of the state. In Montgomery construction at Maxwell Field and residence building are maintaining employment.

Scales Reduced in Dallas

The Dallas school board is preparing a bond issue of $4,500,000 for new schools and has been notified by the local trades that the scales will be reduced 10 per cent on all public work. This is likely to have a similar effect on private construction. An example of lower costs, if not of higher efficiency, is that face brick work, which formerly cost $33 per 1,000 for laying, can now be contracted for with union bricklayers for $27, a reduction of 23 per cent. At this rate the bricklayers earn $9 to $10 a day, against the official scale of $13. Carpenter work and other union work on small jobs is in proportion. The local union permits its members to contract for work because of the many union floaters traveling over the country in automobiles and taking contract work. At Amarillo, Tex., all cement finishers contract their work. Plasterers have recently reduced their scale from $1.75 to $1.50, and bricklayers are expected to reduce theirs to $1.25 in the near future. In San Antonio the outlook is for lower wages, and some contractors have cut carpenters $2 per day.

In Duluth, Minn., the construction outlook is discouraging, though reductions are not expected in the rates given in the table. In Indianapolis construction is going forward at a normal rate. Following are union and actual rates on some additional trades: painters, union, $1.20, actual, $1 per hour; asbestos workers, $1.32 and $1.06; marble and tile workers, $1.50 and $1.20; hodcarriers, 85c. and 76c.; hoisting engineers, $1.28 and $1.02.

Competition for Jobs Cuts Wages

The usual practice holds in Ohio: the larger contractors pay the scale, the smaller cut it. In Akron no recognized effort is being made to cut the scale, but the bricklayers' union recently cut 10c. There is considerable competition, however, among union members long out of work. Concrete workers are paid 75c. per hour and some effort has been made to reduce this to 50c. without success. Leading building contractors of Canton pay 40c. to 60c. per hour for common labor, but local road contractors are paying as low as 25c. with no difficulty in obtaining workers. The city scale is 50c. The carpenters' official rate is $1.25, but on some jobs 75c. to 90c. is paid. Plasterers also are working below scale on some jobs. The same situation holds in Cleveland, where the actual wages quoted are those paid by smaller contractors not affiliated with the building trades employers' association. In Columbus building operations are 25 to 30 per cent of normal, and though some contractors are paying union wages to good men and old employees, the reductions shown in the table are the rule.

Peoria, Ill., is a strong union town and no attempt has been made to reduce wages. All local agreements expiring this year were renewed at the old scale. In Urbana union men are working at the scale, but non-union labor is employed at from 50c. per hour and up, and common labor for 40c., compared with the union rates of 70c. for building common labor and 50c. for street work. At Madison, Wis., the common labor rate is 50c. on union contracts and 30c. to 40c. per hour on other work.

Rates Vary in Minnesota

Construction volume is down in Minneapolis, but in St. Paul is satisfactory due to a larger program of municipal building. The Minneapolis board of park commissioners has eliminated its minimum wage rate. The board has also eliminated the requirement that contractors employ only residents of Minneapolis, because they believe that retaliation on the part of other towns defeats the purpose of this clause. Bidders on this year's $1,000,000 worth of building projects at institutions under the Minnesota state board of control must observe minimum wage scales prescribed by the state. This rate for bricklayers, metal lathers, ironworkers and plasterers is $1.25 per hour; for glaziers, $1; and for laborers 50c. Rates for other trades vary for different sections of the state: carpenters 75c. and 80c.; mason and plasterer tenders, 75c. and 85c.; plumbers, 90c., $1 and $1.12½; painters, 65c. and 85c.

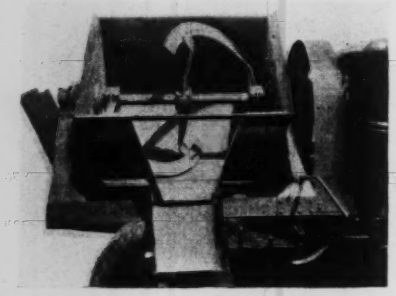
In Butte common labor is paid 72c. per hour; 50c. outside the county. In Casper, Wyo., painters are paid $1.12½ per hour, as are hodcarriers for bricklayers; hodcarriers for plasterers receive $1.25, though the union rate is $1.12½.

Practically all St. Louis construction is done by union workers and the scale is being maintained except possibly in the case of the carpenters. There is no official movement to reduce wages. The rate for common labor is 87½c., but 30c. to 40c. is paid on non-union work. In Kansas City the scale is being maintained, although there is a surplus of unemployed in all trades, which it is expected the recent $40,000,000 bond issue will absorb in the next 60 to 90 days. In Oklahoma City wages are dropping and less employment is in prospect. Phoenix, Ariz., issued 262 building permits this year compared with 425 last year. One of these is for a $1,000,000 bank now being erected. Resident labor is fairly well employed at the rates noted.

Construction Equipment and Materials

Concrete Transport Mixer for Light Motor Trucks

Any light motor truck can be used as a mounting for the Master Mixer, a concrete carrier body made in 1-, 2- and 3-cu.yd. sizes by the Concrete Transport Mixer Co., 650 Rosedale Ave., St. Louis, Mo. As the illustration shows, the body consists of a tilting container, inside of which is a spiral rotor mounted on Timken bearings. The entire construction is of steel, with manganese steel rotor blades. This rotor is driven by the truck motor through a power take-off equipped to give two rotor speeds and reverse action. Its function is to mix and agitate the contents of the body and also, when discharging, to push the concrete to the side spout, making the unit practically self-cleaning. A rear discharge gate can also be furnished if desired. Gears and shafts are ball bearing equipped throughout and are fully protected from concrete and dust.

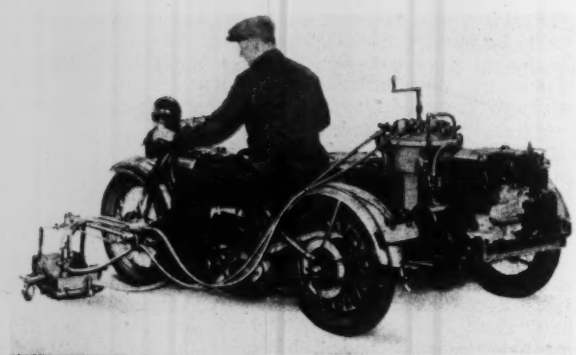


Concrete body in side dumping position

Marking Roads by Motorcycle

By equipping a motorcycle with an air spray paint gun, the Harley-Davidson Motor Co., Milwaukee, Wis., has produced a self-propelling road-marking machine capable of laying down a well-defined, durable traffic mark at a good rate of speed. The motorcycle unit is of the conventional type, but is equipped with a reverse gear for maximum mobility in city streets. A separate Harley-Davidson single-cylinder gasoline power unit drives the air compressor used in painting through a V-belt. Motor and compressor, together with an air tank, paint container and spray gun, are conveniently mounted on a special side car of rugged construction. Provision of a special spray guard accurately defines the width of the line and gives the operator complete control of its direction. The spray gun control valve is operated by a handle bar control. Other auxiliary equipment includes an automatic unloader with pressure regulator, safety valve, pressure gage and drain cock.

With the addition of an extra length of air and paint hose, this unit is available for many painting purposes aside from road marking. These include the painting of guard rails, signs, bridges and buildings, as well as general maintenance work.



Motorcycle unit for marking pavement

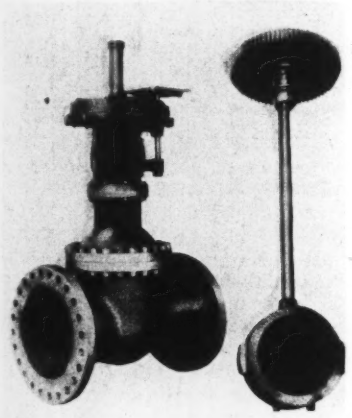
Welded Pipe Elbows

Both 45- and 90-deg. elbows and tees in standard sizes and weights are now being fabricated by forging and fusion by the Locomotive Terminal Improvement Co., Railway Exchange Building, Chicago, Ill. As these units have the same dimensions as standard fittings, they are interchangeable with the latter in the revision of existing piping. Ends are beveled at a 45-deg. angle for direct welding to the pipe line, or the unit may be secured with forged steel or cast steel flanges welded on either end or both ends. Materials available include Byers wrought iron, Toncan or Armco iron, copper bearing steel or wrought steel. These are used in thicknesses to conform to the standard weights of pipe of equivalent diameter or of 10-gage material for use with standard lightweight spiral welded or riveted pipe.

In the process of manufacturing two pieces of homogeneous metal plate are cut to the proper size and forged to exact radius and dimensions. They are then fused together, forming a reinforcing rib along both outer and inner radii of curvature. The process gives uniform wall thickness, a smooth interior and a uniform diameter.

Ball Thrust Bearings Used in High-Pressure Gate Valve

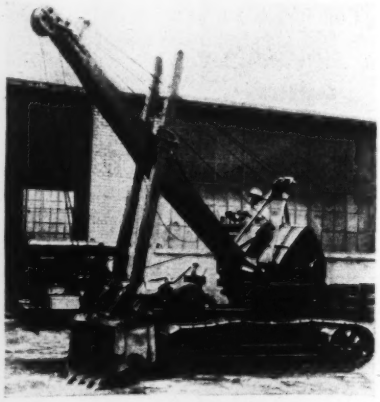
For use in the 1,000-mile gas line now being built from the Texas oil-fields to Chicago, the National Machine Works, 1559 Sheffield Ave., Chicago, Ill., is building a large number of cast-steel gate valves equipped with ball thrust bearings and renewable ground seats. These valves measure 48½ in. from face to face with an inside diameter of 16 in., a total lift of 17 in. and a weight of 5,000 lb. each. The diameter of the pipe is 24 in. and the working pressure will be 600 lb. per sq.in. As the thrust bearings are located in the housing, they add nothing to the total height of the valve and are fully protected against the elements.



High-pressure valve for pipe line service

Stationary Power Unit Drives Revolving Shovel

Removal of the power plant from the turntable of an excavator is the unusual means adopted by the Michigan Power Shovel Co., Benton Harbor, Mich., to obtain a machine with a full-circle loading range, a three-quarter swing digging range and an operating width of only 8 ft. The resulting shovel, believed to be the first of its type, is very fast in action because of the relatively light weight of



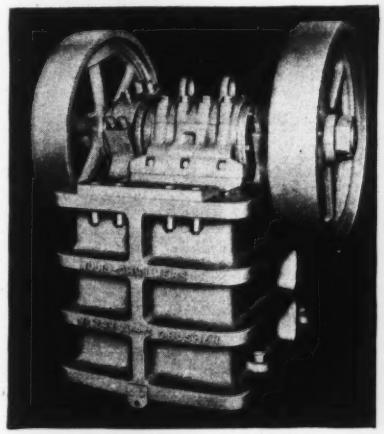
Light revolving power shovel

the revolving elements. Although the bucket capacity of these units is only 12 cu.ft., its makers claim production equivalent to that of a ½-cu.yd. outfit.

The power plant used is a standard 35-hp. tractor unit equipped with air brakes for locking in position while in operation. Hydraulic steering brakes are mounted on the rear axle shafts. All continuous running shafts are mounted on ball bearings. Operation is through three small levers controlling inclosed hydraulic clutches of the disk type. Hoist, crowd and swing brakes are of the internal expanding type. A reversible drum connected to the dipper stick through chain, rack and pinion gives a crowding action. The power boom lifting mechanism, together with an extra drum and a clutch for crane, clamshell, dragline or other attachments, is built into the machine as standard equipment. A small air compressor is attached to the power takeoff of the tractor unit.

Crusher Produces Fines

Fine stone can be produced in one operation, within certain limits of capacity and reduction, with the model 248 fine crusher announced by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., which is said to do in one operation what usually requires a primary crusher followed by a finishing machine. In design, the crusher is a departure from the standard design in that it has but one toggle plate and no pitman, the swing jaw being mounted on the eccentric shaft, from which it receives its reciprocating motion. Freedom from delays due to breakdowns is said to be obtained by the use of quality materials and simplicity in design, the latter greatly increasing accessibility of all parts of the machine. Bearing troubles are claimed to be eliminated by the use of roller bearings in the eccentric shaft and frame. The distance between the jaws regulating the size of the finished product is governed by a hand wheel, which can be adjusted without stopping the machine, changing parts or using tools.



Simplified crusher produces fine stone

Installing floor armor

Continuous Concrete Armor

Unique in design, the new type of floor armoring known as Coat of Mail recently put on the market by the A. O. Smith Corp., Milwaukee, Wis., gives a surface consisting of small rings instead of the customary straight lines. A simple locking device makes it possible to obtain a continuous mat by joining standard panels 20 ft. square. Long life, good reinforcing quality and quick laying are some of the advantages claimed for this product, which can be applied to either one- or two-course construction.

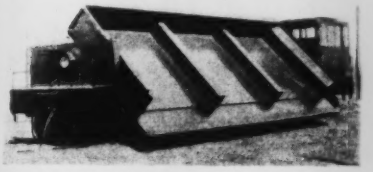
Four- or Six-Cylinder Motors Drive Tractor Truck

To meet the growing demand for a slow-speed engine of the heavy-duty type, the Linn Manufacturing Corp., Morris, N. Y., is prepared to furnish the model 28-D Linn tractor with either a four- or a six-cylinder motor. All units of the two types of machine are identical except the motor, front propeller shaft and transmission. The four-cylinder motor operates at 1,050 r.p.m. and gives a tractor speed of 5 m.p.h.; the six-cylinder at 1,500 r.p.m., giving a maximum speed of 7.15 m.p.h. On long hauls of over 2,000 ft. the six-cylinder model, with its greater speed, shows up to appreciable advantage. On shorter hauls, where the difference in speed is of less importance, the four-cylinder model has a lower first cost, longer life and less maintenance and upkeep expense.

Gas-Electric Locomotive Fitted With Dump Body

Unique in conception and design is the gasoline-electric locomotive and dump car combination perfected by the Differential Steel Car Co., Findlay, Ohio, for service in open pit mines and quarries and in industrial plants where steam equipment is uneconomical and where electric power is not available or is too costly, or where the cost of installation of a distribution system is not justified.

Essentially, the unit consists of a gasoline-electric locomotive with double power plant upon which is fitted a 24-cu.yd. (level load) dump body, thus permitting a pay load to be hauled on the locomotive as well as on trailer cars. The combination weighs 45 tons light and 80 tons when loaded. Power is provided by two Buda gasoline engines, each of which is rated at 155 hp. at 1,200 r.p.m., connected to two Westinghouse generators which supply current to four driving motors. All electrical equipment is made by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Air-brake equipment is Westinghouse combination straight and automatic, with a Gardner-Denver 60-ft. compressor connected to each engine by a belt. The power plant is mounted between the center sills and is thus protected in every way from falling material. Radiators are of the sectional type mounted on the side sills and are equipped with centrifugal fans.

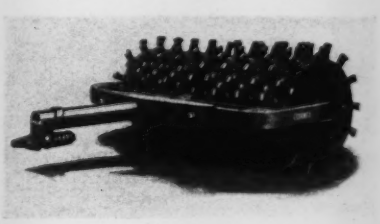


Self-propelled car in dumping position

Control of the locomotive, which is centered in an operator's cab, provides for a maximum tractive effort of 36,000 lb. to overcome starting resistance and for high locomotive speed when maximum tractive effort is no longer required. Starting, stopping, reversing, accelerating and dumping controls are electrical, with mechanical interlocks to safeguard against dangerous methods of operation. Generators are so arranged as to charge a battery while the engine is idling and also serve as series starting motors for the gasoline engines, using the battery as the source of power. For light loads, maximum economy is assured by operation of a single motor and generator set only. Using both power plants, the maximum tractive effort of 36,000 lb. is obtained, with a free running speed of 19 m.p.h. without load. Acceleration is said to be exceptionally good.

Rollers for Tamping Fills

Production of tamping rollers of the sheepsfoot type in both single and twin models has been announced by the road machinery division of the Euclid Crane & Hoist Co., Cleveland, Ohio. Cast-steel teeth designed to be as nearly



Twin-drum sheepsfoot tamping roller

self-cleaning as possible are welded to single or twin rolls mounted so as to permit an oscillating action to conform to the contour of the ground. Attachment to the tractor is through a spring-mounted clevis which cushions shocks resulting from starting and stopping and relieves both tractor and equipment of excessive strain.

Crawler Treads Improved

Designed especially to eliminate friction and to expedite field repairs and adjustments, an improved type of crawler and driving mechanism is now being supplied with the ⅜-, ½- and 1¼-cu.yd. excavators built by the Speeder Machinery Corp., Cedar Rapids, Iowa. The new crawlers are of the lug-driven type, 16 in. in width, and are hinged by three eyes. A roller idler now replaces the idler sprocket on the front of the crawlers. All crawler carrier trunnions and return rollers are bronze bushed. The traction shaft is in three separate pieces, rather than in one long shaft, which allows the removal of any part for adjustment or repair. It is supported by four heavy bronze bushed split bearings and is splined, no keys being used. Travel gears are machine cut, heat-treated and casehardened, and run in grease.

1¼-1½ Yd. Excavator

Flexibility in meeting various conditions is assured in the new 37-B excavator of the Bucyrus-Erie Co., South Milwaukee, Wis., by a large number of options in equipment. These include a choice of diesel, gasoline or electric power; rope or chain crowd on the shovel; various lengths and widths of crawler treads; and provision for shovel, dragline, crane or clamshell operation. Other features include unit steel construction; ball bearings on all continuously running shafts; large oversize clutches; gears inclosed and running in oil; single-shaft drive caterpillar mounting; power operation for hoist clutches; oversize brakes with cooling fins; double chocking brakes on caterpillar mountings; swing brake; power dipper trip, self-locking power boom hoist; and a self-starter for the engine.

37-B excavator rigged as shovel

New Publications

Alloy Cast Iron—Ni-Resist, a corrosion- and heat-resistant nickel-copper-chromium cast iron, is the subject of an 11-p. bulletin 208 issued by the International Nickel Co., Inc., 67 Wall St., New York City.

Motion Pictures—"Construction That Endures" is the title of a one-reel motion picture film dealing with the numerous important uses of concrete which may be borrowed from the Pittsburgh experiment station of the U. S. Bureau of Mines, Pittsburgh, Pa.

Air Compressors—Advantages of the air-cooled type of air compressor, as brought out during a series of comparative tests at the Case School of Applied Science, are detailed in a 16-p. bulletin "4 Air Compressors Went to School," issued by the Davey Compressor Co., Inc., Kent, Ohio.

Concrete Demolition—Methods of use and results obtained with the hydraulic cartridge, designed to replace the use of explosives in the demolition of plain or reinforced concrete, are described in a folder of the Hydraulic Concrete Breaking Co., 439 Penobscot Building, Detroit, Mich.

Cast-Iron Pipe—Users of the "Handbook of Cast-Iron Pipe" published by the Cast-Iron Pipe Research Association, 122 South Michigan Ave., Chicago, Ill., should procure a copy of a recent supplement issued to correct typographical errors and to present new data resulting from certain changes in standards.

Power Transmission—Seven types of positive drive for the transmission of power are described in book 1293 of the Link-Belt Co., 300 West Pershing Road, Chicago, Ill. These include silent and roller chains, herringbone gears and speed reducers, steel and malleable chains, worm gear speed reducers and the P.I.V. variable speed transmission.

Asphalt Paint—Two pamphlets descriptive of asphalt paints as waterproofing materials have been issued by the American Asphalt Paint Co., 844 Rush St., Chicago. Both are profusely illustrated in colors, and one, with 52 pages, deals with waterproofing in general while the other, 16 pages, is devoted particularly to Gilsonite asphalt.

Structural Steel—Revisions in the wide flange structural steel sections made by the Carnegie Steel Co., the Bethlehem Steel Corp. and the Illinois Steel Co. have resulted in the issue of a new and abridged edition of the well-known "Pocket Companion" of the Carnegie Steel Co., Pittsburgh, Pa. In addition to the CB series, this volume also covers the more commonly rolled sections used in structural design, car and ship building. It supersedes all earlier issues of the Pocket Companion and while abridged in character contains all information ordinarily required by the user of structural shapes. A new size of book and style of type have been adopted, and a convenient marginal index simplifies use.

Concrete Pipe—Construction of a 26-mile concrete force main used to convey a new water supply to St. Petersburg, Fla., forms the subject of an illustrated bulletin issued by the Lock Joint Pipe Co., Ampere, N. J.

Truck Bodies—Dump bodies for trucks of from 1 to 3 tons capacity are illustrated and described in a folder of Hercules Products, Inc., Evansville, Ind.

Alloys—Data and specifications pertaining to Nichrome and other alloys produced by the Driver-Harris Co., Harrison, N. J., are contained in a 68-p. illustrated book R-28 issued by that company.

Concrete Accessories—Chairs, spacers and other accessories used in reinforced-concrete road and bridge construction are the subjects of a recently issued supplement to the building specialties catalog of the Union Steel Products Co., Albion, Mich.

Grading Equipment—Bulletins have been prepared by the Austin-Western Road Machinery Co., 400 North Michigan Ave., Chicago, Ill., describing the model 12½-25 dual drive motor grader, the contractor's special elevating grader and the model 5 planer.

Explosives—"The Use of Parallel Connections for Electric Blasting in Tunnels and Drifts" is the subject treated in the April issue of the *Explosives Service Bulletin*, issued by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

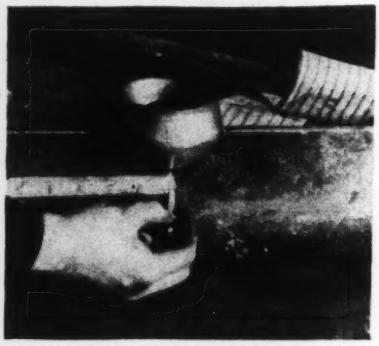
Cranes and Shovels—Bulletins have been issued by the Bucyrus-Erie Co., South Milwaukee, Wis., describing the model GA-3 1½-yd. gas plus air convertible excavator and the newly acquired Loadmaster mobile crane for handling moderate loads. The latter can be equipped with air compressor, power winch, bulldozer or other auxiliary equipment described in the bulletin.

Electrical Equipment—Recent publications of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., deal with the following subjects: airport floodlighting, the 600-amp. FlexArc welder, alternating current waterwheel-driven generators, small generator units and their application, lightning arresters and a new steel tank mercury arc rectifier.

Device Facilitates Connection to Welded Pipe Lines

Special fittings designed to facilitate the welding of branch connections to old or new pipe lines are now being produced by the Bonney Forge & Tool Works, Allentown, Pa., under the names Weldolet and Thredolet. These differ only in the means used for attaching the branch pipe, one being for welded connections and the other for threaded connections. Both, however, are fastened to the main pipe by a V-weld. In the process of installation the fitting is first tack welded to the main pipe, then puddle welded along the V-edge. Then the section of pipe inside the fitting is separated by an S-shaped cut and the individual pieces are removed, leaving the way clear for the attachment of the branch pipe. The heavy construction of the fittings prevents any distortion or weakening of the main pipe and provides ample reinforcement at the joints.

An important advantage of the new fitting is the fact that it provides a funnel-shaped outlet, thus reducing friction and turbulence at the joint. Furthermore, attachment to the main pipe is made by means of a V-weld, the strongest and simplest type of weld.



Pipe fitting ready for welding

CONSTRUCTION NEWS

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Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	*Project*	*Cost*	*Status*
Waterwork:			
Quebec City (Que.)	Reservoir	$1,000,000	Bids asked
Sewers			
Toronto (Ont.)	Sewerage system and disposal	20,000,000	Proposed
Unclassified			
Tennessee	Gas pipe line	2,500,000	Contract
Factories and Mills			
Cleveland	Factory	1,000,000	Contract
Warehouses			
Bayonne (N.J.)	Shipping terminal	1,000,000	Proposed
Buildings			
Louisville	Apartment	1,000,000	Contract
Osterville (Mass.)	Hotel	1,000,000	Bids asked
New York	Church	1,000,000	Proposed
Pittsburgh	Church	1,000,000	Proposed
Chicago	Nurses home	2,350,000	Proposed
Erie (Pa.)	Hospital	1,250,000	Proposed
Houston (Tex.)	Hospital	1,500,000	Proposed
Montreal	Hospital	1,000,000	Proposed
Los Angeles	Loft	1,000,000	Proposed
New York	Office	1,000,000	Proposed
New York	Office	2,500,000	Proposed
Newtown (Conn.)	State asylum	1,250,000	Bids asked
Jersey City	Hall of Records	2,000,000	Proposed
New York	Boro hall and court house	7,000,000	Proposed
Providence	Court house	2,000,000	Bids asked
Springfield (Mass.)	Theatre and office	1,000,000	Proposed

WATERWORKS

PROPOSED WORK

Calif., Napa—City Council 2 mi. pipe line, pumping plant to provide water for Browns Valley Sect. $15,000. H. Harrold, city engr.

Ill., Millstadt—City Council, new bids probably in July motor-driven deep well turbine pump, one motor-driven and one engine-driven high service pumps, 20,000 gal. capacity surface concrete reservoir with wooden cover, 75,000 gal. steel tank on 125 ft. tower, concrete found. Former bids rejected. Russell & Axon, 6200 Easton Ave., St. Louis, Mo., and 408 Daniels Bldg., Springfield, Mo., engrs. Noted Mar. 26.

Minn., St. Louis Park—Village bids in summer, 10 to 15 blocks 6 in. water main. $15,000. Alexander & Bradley, 410 New York Life Bldg., Minneapolis, engrs.

N. J., Trenton—Ewing Twp. Com., mains in Prospect, Spruce, Columbia, Madison, 6th, 7th, 8th, 9th, 11th and 12th Sts. $25,000. M. L. Howell, Trenton Junction, twp. clk.

Ont., Westboro—H. L. Corbett, clk., Westboro, installing 100 complete water service connections, furnishing 500 sets of ¾ in. diam. corporation brass goods and 25,000 lin.ft. ¾ in. diam. copper pipe, for Nepean Twp. $15,000. James, Proctor & Redfern, 36 Toronto St., Toronto, engrs. Noted Mar. 19.

BIDS ASKED

Minn., Brainerd—See "Contracts Awarded."

Minn., Morris—June 15, by J. A. Mielke, city mgr., 750,000 gal. reservoir, rein.-con. pump house with two 1,000 g.p.m. pumps, $35,000. S. A. Siverts, Jr., 454 Sexton Bldg., Minneapolis, engr. Noted Oct. 23, 1930.

N. H., Keene—City, taking bids reservoir and dam at Roaring Brook, Roxbury. $15,000 or more. Weston & Sampson, 14 Beacon St., Boston, Mass., engrs.

N. J., Jersey City—See "Contracts Awarded."

N. J., Passaic—June 15, by Passaic Valley Water Comn., 156 Ellison St., Paterson, 12,500 lin.ft. 36 in. steel plate or c.i. pipe or 34 in. cylinder concrete pipe line and 6,400 lin.ft. 20- to 24-in. c.i. pipe line in Passaic and Clifton. $30,000 or more. Fuller & Everett, 25 West 43rd St., New York, engrs.

N. Y., Brooklyn — June 16, by Dpt. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Grace Court, Hunts Alley, Boreum and Garden Pls., Avenue P, Albany, Bedford, Carleton, Fillmore and 3rd Aves., Baltic, Madison, Pacific, President, Pulaski, 61st, East 18th, East 31st Sts.

N. Y., Kenmore—June 15, by Village Bd., Town Hall, 12 in. water line in Hamilton Blvd. from Colvin Blvd. to Elmwood Ave. $55,000. C. F. Duchscherer, engr.

N. Y., Ticonderoga—June 25, by Bd. Village Trustees, Village Office, 5 mi. Class 100 14 in. and 2.5 mi. Class 150 10 in. c.i. pipe, Div. 1; hauling, excavating trench and laying pipe and constructing 1 m.g. concrete reservoir, Div. 2. J. P. Wells, 80 East Ave., Rochester, engr.; adv. E.N.-R. June 11.

O., Greenwich—June 19, by Village Clerk, erecting 10 x 16 ft. pump house, installing 2 centrifugal pumps with valves, etc. and laying 8,400 ft. 6 or 8 in. c.i. pipe. $30,000. Jennings-Lawrence Co., Rowlands Bldg., Columbus, engr.

Tex., Taylor—City, c/o F. V. Swain, supt. Waterworks, taking bids 150,000 gal. reservoir, Hawley, Freese & Nichols, 417 Capps Bldg., Fort Worth, consult. engrs. Noted Apr. 23.

Wash., La Conner—June 18, by City Comrs., improving, extending waterworks, incl. 26,500 ft. 6 in. steel pipe, filter and concrete filter building, 200,000 gal. cement lined reservoir and repairing existing system, 6,000 ft. 4 and 6 in. c.i. pipe and fittings. $40,000. W. C. Morse, Smith Tower, Seattle, engr. Noted Apr. 23.

Que., Quebec City — Taking bids reservoir, Battlefields Park. $1,000,000. E. Hamel, city engr.

CONTRACTS AWARDED

Calif., St. Helena—City Council, waterworks extensions, to P. L. Burr, 320 Market St., San Francisco, $2,549; pipe and fittings, to C. G. Clausen, 825 Folsom St., San Francisco, $6,971; valves, to Renssalaer Valve Co., Sharon Bldg., San Francisco, $217; meter, to Neptune Meter Co., 320 Market St., San Francisco, $255. Grand total $10,012. Noted Apr. 30.

Kan., Smith Center—V. E. Barger, city clk., waterworks extensions, incl. concrete lining for settling reservoir, brick pumping station, miscellaneous piping, to O'Neil Constr. Co., Leavenworth, 300 g.p.m. electric motor driven horizontal centrifugal pump, 300 g.p.m. electric motor driven triplex pump, to Forslund Pump & Mchy. Co., 3031 Main St., Kansas City, Mo.

Mass., Milford—For 6 and 8 in. water line extension from Milford to Braggville, incl. standpipe, to Cenedella & Co., 167 Main St. Est. $20,000.

Mass., Reading—Town, Bd. P. Wks., 1 story, 25 x 30 ft., brick pumping station, to A. B. Rounds, 58 Montvale Ave., Stoneham, $7,447; wells, well connections, to S. B. Hamilton, 43 Beech St., Melrose, $5,300. Noted Apr. 30.

Mont., Forsyth—General contract filtration plant, to J. C. Boespflug, Miles City $28,000; and to International Filter Co., 333 West 35th Pl., Chicago, Ill., $18,150. Noted Apr. 30.

N. J., Florence—Florence Twp. pumping station, settling basin, equipment, to Seaman & Letzgus, Stone Harbor, $25,783.

N. J., Jersey City—Bd. City Comrs., City Hall, c.i. mains, fire hydrants, valves, gate boxes in Summit Ave., day labor. $90,000. J. Henderson, city engr.

N. Y., St. George—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Barnes and Brighton Aves., to G. V. Cornell Constr. Co., 30 Egbert Pl., St. George, $41,400. Noted May 21.

O., Cleveland—For 2 m.g. steel tank at East 260th St. and St. Clair Ave., to Petroleum Iron Wks., Sharon, Pa.

O., Massillon — Ohio Water Serv. Co., new water treatment plant, to soften Massillon City Water, 3rd St. N. W., to Meinhart Contg. Co., Massillon, $160,000. Est. $175,000.

O., Youngstown — City, conduits, wiring on Meander Dam, Mahoning Sanitary Dist. Water Project, to G. A. Webster, 117 North Phelps St., $25,502. Est. $25,000.

Okla., Lawton—T. Sanders, city clk., new 10 mi.g. water filtration plant, equipment, to Sherman Iron Wks., 18 East Main St., Oklahoma City, $128,777. Est. $150,000.

Okla., Okarche—City, J. C. Busche, clk., new waterworks, incl. 53,000 ft. 4- to 8-in. c.i. pipe, deep well pump, motors, to Connelly Bros., El Reno, $46,200. Est., $50,000. Noted Apr. 9.

Tex., Thorndale—City, c/o W. B. Elliott, mayor, complete waterworks, incl. 6, 8 and 12 in. pipe, valves, hydrants, 50,000 gal. elevated tank, pumps, motors, to Kirkwood, Wharton & Lee, 53 North Flores St., San Antonio. Noted May 7.

Utah, Salt Lake City—City Comrs., City Hall, 36 in. concrete, steel pipe from Little Cottonwood to Big Cottonwood Creeks, to Christensen & Gardner, Vermont Bldg., $198,311. Est. $200,000.

Ont., Ancaster—Twp. laying mains in connection with waterworks, to G. Simone, 10 Coleridge Ave., Toronto; standpipe, to Horton Steel Works, Bridgeburg; standpipe found., to W. B. Russell, Hermant Bldg., Toronto; drilling deep wells and supplying pumps, to Jordan-Roberts Sales Ltd., Morrell St., Brantford; valves, to Canadian Valve & Hydrant Co., Morrell St., Brantford; c.i. pipe, to Gartshore Thompson Co. Ltd., Stuart St. W., Hamilton. Est. $40,000.

SEWERS

PROPOSED WORK

Calif., Los Angeles—City Council, vitr. and cement sewers in Anaheim St. and Badger Ave. Sewer Dist. $97,200.

Calif., South San Francisco — City Council surveys sanitary sewerage system, incl. outfall for section bordering on San Bruno in industrial area. To exceed $25,000. R. A. Klassen, Redwood City, engr.

Calif., Whittier—City Council improving sewage disposal plant, for odor control, incl. rein.-con. aeration tank, 2 horizontal centrifugal pumps direct connected to electric motors, air blowers, chlorination equipment. $25,000 or more. Black & Veatch, 307 South Hill St., Los Angeles, engrs.

Kan., Topeka — City Council, preliminary plans 36 in. storm water sewer line in 2nd and Polk Sts. to 10th and Western Sts. $60,000. W. E. Baldry, City Hall, engr.

See proposal advertising on page 92

Constr News page 251

LEADITE

Trade Mark Registered U.S. Pat. Office

LEADITE is frequently used *where VIBRATION exists*

Left:
10" c.i. Pipe Line (with LEADITE Joints) across Bridge, in a Southern city.

Below:
C.i. water main across Bridge (with LEADITE Joints) in a Pennsylvania city.

Many cast-iron bell and spigot water lines which run ACROSS BRIDGES, in various parts of this Country, are JOINTED WITH LEADITE.

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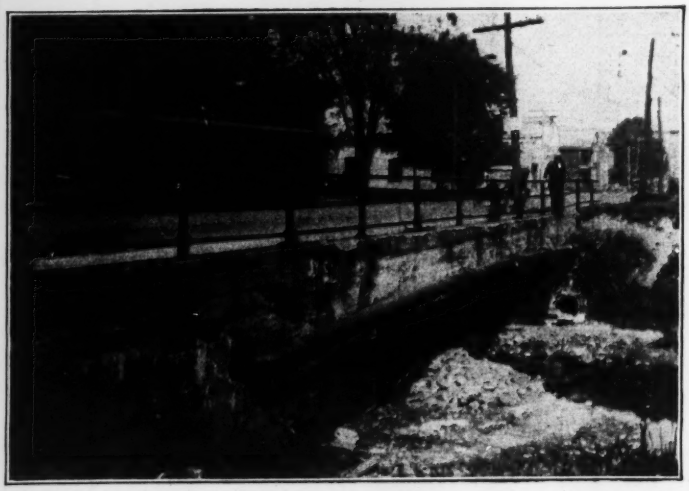
LEADITE has successfully met ALL CONDITIONS known to the laying of cast-iron water mains,—and is today used upon thousands of miles of such work, throughout this country, and in many overseas countries.



The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Title Building, Philadelphia, Pa.

No Caulking

Sewers (Continued)

Kan., Topeka—City Council, withdrew from program, 36 in. storm sewer from 2nd and Polk Sts. to 10th and Western Sts. $60,000. Project indefinitely postponed. W. E. Baldry, City Hall, engr. Noted June 4.

Mass., Gardner—Commonwealth of Massachusetts, State House, Boston, preliminary plans sewage disposal system, at Gardner State Hospital. $25,000. J. J. VanValkenburgh, Irving Sq., Framingham, engr.

Mo., Wellston—Wellston Sewer Dist., will not construct storm water and sanitary sewers. $4,500,000. Project dropped because of change in state law under which district was organized. Noted Oct. 3, 1929.

Mass., Wrentham—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, additional filter beds for sewerage system, at Wrentham State Hospital. $30,000.

N. J., Newark—Bd. City Comrs. City Hall, preliminary plans sanitary sewerage system in Grafton Rd. $50,000. J. Costello, city engr.

O., Van Wert—Sewage treatment and intercepting sewers. $500,000 bond election in November for same. Jennings-Lawrence Co., 79 East State St., Columbus, engrs.

R. I., Providence—Sewerage work in Sinclair Ave. Peace, Pontiac, Alto and Canonchet Sts. $25,000.

Tenn., Chattanooga — City Council, sewer mains in Bramard Addition. $200,000.

Tex., Mt. Pleasant—Surveys sewage disposal plant improvements, incl. enlarging, some new equipment, etc. $30,000. D. S. Nolte, Mt. Pleasant, engr.

Ont., Toronto—Soon takes bids 8 in. and up vitr. tile storm and sanitary sewers in University Ave. $40,560. R. C. Harris, City Hall, engr.

Ont., Toronto—City retained Metcalfe & Eddy, Statler Bldg., Boston, Mass., and Gore Nasmith & Storrie, Confederation Life Bldg., consult. engrs., to investigate and report plans for doubling capacity disposal and sewerage system throughout the city. $20,000,000. R. C. Harris, city engr.

BIDS ASKED

Ill., Aurora—June 23, by Bd. Trustees Aurora Sanitary Dist., 2.5 mi. 8- to 30-in. sewers. Eng. Serv. Co., 59 South La Salle St., engrs.

Ind., New Bremen — June 15, by J. M. Brucken, clk. city clk., Herman Street and Jefferson Street Interceptors, and Walton Street Storm Relief Sewer. C. J. Simon, Van Wert, O., engr.

Md., Easton—June 17, by Mayor and Council, 1,000 ft. 15- to 20-in. terra cotta storm drains. E. G. Kastenhuber, Jr., town engr.; adv. E. N.-R. June 11.

Mass., Boston—June 15, by Dpt. P. Wks., J. A. Rourke, comr., sewerage works in East Boston, June 16, in Dorchester, $25,000; June 18, in Dorchester and Hyde Park, $25,000.

N. J., Chatham — Bids about July 1, storm sewers. $25,000. C. Potts, 30 Church St., New York, engr.

N. Y., Batavia—June 25, at office Executive Dpt., Div. Standards & Purchase, F. L. Morris, supt., Albany, sewer and water lines for Batavia School for Blind; adv. E. N.-R. June 11.

N. Y., New York—June 17, by S. Levy, pres. Manhatton Boro, Municipal Bldg., sewers in 59th St. from 11th Ave. to pierhead line Hudson River; at 58th St. and 10th Ave., 56th and 58th Sts., between 10th and 11th Ave., in connection with west side improvement of New York Central R.R. Contr. 5.

N. Y., New York—June 18, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., sewers in Hoxie St., Fish, Barker, Bissell and Cranford Aves.

S. D., Watertown—June 16, by City, sewage disposal plant. $225,000. W. F. Cochrane, city engr. Noted Oct. 30.

CONTRACTS AWARDED

Ind., Anderson—Bd. P. Wks., new sewerage system, in Southwest Dist. to Weiss & Horan, Anderson, $25,206. Est. $29,000. Noted Apr. 30.

Md., Baltimore—Bd. Awards, sanitary sewers, appurtenances, incl. triple conduit inverted syphon, Sanitary Contr. 270, to Marocco Contg. Co., 231 South Exeter St., $43,319; furnishing, delivering vitr. terra cotta sewer pipe, to Bureau of Sewers, Material Contr. 83, to Pen Mar Co., Munsey Bldg., $20,573.

N. J., Plainfield—Common Council, 2nd Sect. West End storm sewer, to Spiniello Constr. Co., 437 Riverside Ave., Newark, $99,937. Noted May 14.

N. J., Pleasantville — Bd. City Comrs., City Hall, repairing and altering Woodland Ave. Sewage Disposal Plant, to C. E. Miller, Pleasantville. Est. $25,000. Noted Oct. 23.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, storm water sewers in Shore Blvd., to Alvon Contg. Co., 4702 Glemore Rd., $549,998; East 51st and 53rd Sts., to R. Nazzaro, Inc., 7101 11th Ave., $3,672 and $1,869 respectively; East 5th and 68th Sts., to J. Loschiabo, 2315 Avenue U, $1,243 and $744 respectively; 68th St., to Vaccaro, 1268 60th St., $1,156; East 42nd St., to S. Guerriero, 1024 66th St., $1,207. Grand total $559,889. Noted May 14.

N. Y., St. George—J. A. Lynch, pres. Richmond Boro, Boro Hall, sanitary sewers in Norden St., to J. Fiorini, 135 St. Paul Ave., $2,586; in Myrtle Ave., to S. Pimnone, 237 Burgher Ave., Port Richmond, $1,381; repaving Greenleaf Ave., to N. Vanderbilt & Son, 28 Elizabeth St., West New Brighton, $12,135. Grand total $16,102. Noted May 14.

O., Cleveland — For Southerly Intercepting Sewer in Pittsburgh Ave., incl. 2,310 ft. No. 9 E brick pipe, to Joseph Winterbottom Co., 1406 West 25th St., $84,224.

Pa., Forest Hills—Boro, E. S. Smull, clk., Boro Bldg., 3 mi. 8 and 10 in. terra cotta pipe, manholes, inlets, headwalls, part Dists. 2 and 3, to LeDonne & Casper, 7305 Frankstown Ave., Pittsburgh, $34,955. Noted Apr. 9.

WASTE DISPOSAL

PROPOSED WORK

Mich., Dearborn—City, City Hall, authorized Hubbell, Hartgering & Roth, engrs., 2640 Buhl Bldg., Detroit, to prepare plans garbage disposal works on newly acquired site, Greenfield Rd. and Detroit, Toledo & Ironton R.R. $800,000.

Que., Montreal—City, 3 incinerators. $225,000. D. Beaupre, city archt. Noted Nov. 27.

BIDS ASKED

Ont., Hamilton—June 17, by City 3 story, 124 x 133 ft., rein.-con. incinerator building. Total $300,000. Furnace contract already awarded. W. L. McFaul, City Hall, engr. W. J. Walsh, Terminal Bldg., archt. Noted June 4.

BRIDGES

PROPOSED WORK

Calif., Los Angeles — City Council, 100 ft. concrete arch bridge with 45 ft. roadway and four 60 ft. span rein.-con. girder bridge with 60 ft. roadway in connection with widening Gaffey St.—950 ft. steel arch grade separation, 200 ft. main span at 1st St. and Glendale Blvd., $300,000 or more—one 85 x 100 ft. and one 80 x 100 ft. steel deck girder grade separations in connection with opening Silver Lake Blvd. M. Butler, city bridge engr.

N. J., Brielle — Bd. Freeholders Monmouth Co., Court House, Freehold, steel, concrete bridge over Central R.R. on new hy. between Belmar and Brielle. $100,000. G. K. Allen, 60 Broad St., Red Bank, engr.

Mich., Muskegon—Muskegon Co., Mona Lake Bridge to have 10 spans, 70 ft. long and 11 spans 19 ft. long, concrete, steel, with concrete piers, abutments, 30 ft. roadway with two 3 ft. sidewalks on either side, over Mona Lake. $190,000. L. H. Neilsen, Muskegon, co. engr.

N. J., Plainfield—Bd. City Comrs., City Hall, steel, concrete viaduct over Green Brook between Watchung and Madison Aves. $25,000 or more. **Maturity probably soon.**

Okla., Tulsa—City Council preliminary plans widening to 40 ft. width 2,000 ft. concrete bridge at 4th St. between Tulsa and West Tulsa. $175,000. H. A. Parker, City Hall, engr.

Tex., Fort Worth—Tarrant Co., c/o W. E. Yancey, aud., steel, rein.-con. bridge over Trinity River on Handley and Elderville Rds. W. Stevens, Fort Worth, engr.

B. C., Ashcroft — Provincial Government, Victoria, soon takes bids 8 span, 800 ft. timber or steel hy. bridge, on concrete piers, over Thompson River. $100,000. P. Philip, Dpt. P. Wks., Victoria, engr.

Ont., Orangeville—Dufferin Co. one 50 ft. and one 120 ft. span rein.-con. trussed arch bridges on county road system. $25,000. Christie & Beatty, Court House, engrs.

BIDS ASKED

California—June 24, by C. H. Purcell, engr. State Hy. Comm., Sacramento, rein.-con. bridge to have 127 ft. open spandrel arch and two 44 ft. and two 36 ft. girder spans over Granite Creek, 14 mi. north of Monterey, Monterey Co.; multiple span arch bridge to have two 95 ft., two 102 ft. and two 106 ft. span on concrete piers with abutment founds. over Santa Ana River, near Riverside, Riverside Co.

Calif., Ukiah—June 17, by State Hy. Comm., Sacramento, bridge to have two 125 ft. timber truss spans, eight 19 ft. timber trestle spans, grading, bituminous treated crushed gravel or stone surfacing 170 ft. roadway approaches, over Russian River, 2 mi. south of here, Mendocino Co. C. H. Purcell, hy. engr.

Ill., Joliet—July 7, by State of Illinois, Dpt. Purchases & Constr., Div. Waterways, Springfield, temporary bridge over Illinois Waterway (now under construction) at Van Buren St. L. D. Cornish, ch. engr.; adv. E. N.-R. June 11.

Ia., Rockwell City—June 15, at office Auditor Calhoun Co., two 24 x 18 ft. and one 50 x 18 ft. multiple span I-beam bridge. Address County Engineer.

Maine—June 17, by State Hy. Dpt., Augusta, bridges over Bear Brook, Charlestown, involving 208 cu.yd. concrete—over Deer Meadow Brook, Newcastle, 86 cu.yd. concrete—over Medomak River, Washington and Union, 389 cu.yd. concrete—over Presumpscot River, Windham and Horham, 1,200 cu.yd. concrete—over Medomak River, Washington, 225 cu.yd. concrete—over Mill Brook, Newcastle, 151 cu.yd. concrete—super structure bridge over Sebasticook River, Palmyra, 286,000 lb. steel—substructure and flooring, for same bridge, 400 cu.yd. concrete—superstructure bridge over Williamantic, 101,300 lb. steel—substructure, same bridge, 240 cu.yd. concrete.

Maryland—June 16, by State Roads Comm., G. C. Uhl, chn., Baltimore, extending existing stone masonry bridge, on Natl. Pike, Contr. Ho-97-511, Howard Co.; adv. E. N.-R. June 11.

Mich., Port Huron—June 16, by E. C. Fitzpatrick, city clk., 114 ft. bridge superstructure over Black River, at 7th St., incl. 380 tons steel and machinery, 420 cu.yd. concrete and substructure, incl. 3,200 cu.yd. concrete, 26,000 lin.ft. piles, 260 tons reinforcing steel, E. R. Whitmore, City Hall, city engr. Noted Mar. 19.

Minnesota—June 16, by State Hy. Dpt., St. Paul, Bridges 5106, 5107, 5108, 5109, 5110, on State Project 11-39, Sects. 2 and 3, all north of Virginia, St. Louis Co.—Bridge 5100, Cold Springs, Stearns Co.—Bridge 5111 on S. P. 25-22-3, south of Buffalo, Wright Co. — Bridge 5119, S. P. 12-33, near Granite Falls.

Minn., Duluth—June 22, by W. H. Borgen, aud. St. Louis Co., Court House, Bridge K-O-22-1 on S.A.R. 24, Sect. 22. To exceed $25,000 S. B. Shepard, Court House, co. engr.

New Jersey—Joint Bd. City Comrs. Asbury Park and Ocean Grove, City Hall, Asbury Park, bids about July 1, 2 steel, concrete bridges, one over Wesley Lake at Emery St., other at Beck Ave. between Asbury Park and Ocean Grove, $70,000. M. Rogers, 418 Monmouth Ave., Bradley Beach, engr. Noted Apr. 9.

N. J., Englewood — June 22, by State Hy. Comm., Trenton, bridge to carry Jones Road across Route 4, Sect. 3, Bergen Co. A. L. Grover, ch. clk.; adv. E. N.-R. June 11.

N. Y., Buffalo—June 18, by W. Rathman, comr. P. Wks., Municipal Bldg., repairing and reconstructing bridge on Seneca St., east of Fillmore Ave., $200,000; reconstructing truss span Michigan Ave. Viaduct—107 ft. truss span Hamburg St. Viaduct — repairing and reconstructing viaduct at intersection Elk St. and Abbot Rd. Reidpath & Wilson, Gerrans Bldg., engrs.

N. Y., Tonawanda—June 16, by W. G. Hickman, comr., Erie Co., 20 County Hall, Buffalo, steel plate girder bridge over Ellicott Creek, Delaware Ave. G. Diehl, Ellicott Sq., Buffalo co. engr.

Texas—June 22, by State Hy. Comm., Austin, 14 concrete, trestle relief openings, rein.-con. bridges, concrete, steel bridges, steel, concrete, treated timber bridges, concrete structures, steel, concrete overpasses, in Caldwell, Fisher, Kimble, Mason, McLennan, Presidio, Robertson, Smith, Van Zandt, Tarrant, Victoria, Brazos, Burleson and Kerr Counties. To exceed $1,000,000. G. G. Wickline, ch. engr. comm.

Wisconsin—June 19, by State Hy. Comm. and Hy. Coms. Monroe and Juneau Counties, Madison, constructing Hughart Bridge—Maum Bridge—Burmeister Bridge and 2 cattle passes — Kuckuck Bridge—McCaul Bridge—James Bridge and 2 cattle passes—Franz Bridge, all on Project 325-F, Monroe Co.

CONTRACTS AWARDED

Arkansas—State Hy. Dpt., Little Rock, 4 concrete bridges, 100 to 137 ft. long, Union Co., to F. A. Gerig & Co., Arkadelphia, $27,575—375 ft. steel, concrete bridge, Newton Co., to F. Littjohann, Topeka, Kan., $55,224—three 91 to 95 ft. steel, concrete bridges, Pike Co., to Kochtitsky & Johnson, Inc., Forest City, $82,465. Grand total $165,264.

California—State Hy. Comm., Sacramento, removing concrete deck of seven 164½ ft. through steel truss spans of bridge over Santa Ynez River, near Buellton, constructing laminated timber flooring, surfacing with bituminous macadam, to Neves & Harp, Santa Clara, $18,099; replacing three 60 ft. steel truss spans with concrete girder spans, widening rein.-con. girder approach spans consisting two 31 ft., eight 30 ft., two 21 ft. spans, over Santa Ana River, 2 mi. north of Newport Beach, Orange Co., to Nead Constr. Co., Wilmington, $59,947. Noted Apr. 30.

California—C. H. Purcell, engr. State Hy. Comm., Sacramento, constructing 4 and widening 2 rein.-con. slab bridges, varying in length from 30 to 105 ft., 34 ft. roadway between Goshen and Kingsburg, Tulare Co., to J. S. Metzger & Son, 332 West Jefferson St., Los Angeles, $36,290. Noted May 14, under "Streets and Roads."

Calif., San Francisco—S. J. Hester, secy. Bd. P. Wks., City Hall, Sloat Blvd. Viaduct, at Sunset Blvd., to Mission Concrete Co., 270 Turk St., $115,433. Noted May 14.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, bridges in Williamson Co., to M. & P. Contg. Co., Rockport, Ind., $29,085—Macon, DeWitt and Piatt Counties, to Hartman-Clark Bros., 920 Peoria Life Insurance Bldg., Peoria, $76,144—Route 48, Sect. 135-B and C, Christian Co., to Clinton Bridge Wks., Clinton, Ia., $27,068 and $8,655 respectively—Route 69, Sect. 124B La Salle Co., to H. C. Holmes, Macomb, $9,280—Route 69, Sect. 124-C, La Salle Co., to Worden Allen Co., Chicago, $25,408—Ogle Co., to A. P. Munsen, Marion, Ia., $19,460—Macoupin Co., to M. C. Robinson, Girard, $15,972—Lake Co., to F. E. Herdman, Winnetka, $65,204. Grand total $270,876. Noted Apr. 9 and 30.

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Bridges (Continued)

Iowa—State Hy. Comn., Ames, 13 box culverts, 5 culvert pipe extensions, Iowa Co., to H. T. Stillman, Ames, $7,990—3 I-beam and 1 pony truss bridge, Jackson Co., to P. Jayne, Cedar Rapids, $31,044—160 x 20 ft. high truss bridge with six 50 x 20 ft. I-beam approach spans, Lyon Co., to C. J. Kramme Co., Ft. Dodge, $29,422—two 42 x 24 ft. and one 45 x 24 ft. I-beam spans over railroad, Marshall Co., to A. Olson Constr. Co., Waterloo, $15,733. Grand total $84,189. Noted May 21.

Kansas—State Hy. Comn., Leavenworth, two 80 ft. steel truss and four 30 ft. deck girder span bridge, Kansas Project 92, to Jensen Constr. Co., Kimballton, Ia., $26,786.

Maryland — State Roads Comn., G. C. Uhl, chn., Baltimore, steel, concrete bridge, Contr. CE-97-23, Cecil Co., incl. necessary earth approaches, surfacing, to Harry T. Campbell & Sons Co., Towson, $72,801. Noted Feb. 26.

Mass., Worcester—Boston & Albany R.R. Co., G. A. Kirley, Boston, ch. engr., rebuilding steel, concrete bridge over Hamilton St., to J. F. Fitzgerald Constr. Co., 38 Chauncy St., Boston. Est. $25,000.

Michigan—H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, Br. 2 of 73-6-1, 2 rein.-con. abutments, steel deck girder, with concrete flooring, surfacing, two 2½ ft. sidewalks, Contr. 2, to American Bridge Co., 1328 Buhl Bldg., Detroit, $12,070; Contr. 3, to M. E. Hull & C. A. Hull, Dryden, 51,586, incl. cement, for State Hy. Comn., Lansing. Noted May 7.

Minnesota and Wisconsin—State Hy. Dpt., St. Paul, Minn., and State Hy. Comn., Madison, Wis., Court House, LaCrosse, Wis., West Channel Bridge over Mississippi River, from LaCrosse, Wis., to La Crescent, Minn., to Wausau Iron Wks., Wausau, $123,807. Noted May 7.

Nevada—Director State Hy. Dpt., Carson City, rein.-con. bridge, approaches over Virgin River on Dixie Hy., between Mesquite and Bunkerville, Clark Co., to Dodge Bros., Inc., Fallon, $188,-221. Est. $113,516.

N. H., Lisbon—State Hy. Dpt., Concord, superstructure 139 ft. steel bridge, to Kittredge Bridge Co., Concord, $15,119.

N. J., Newton—Sussex Co., Court House, constructing 3 concrete bridges, one over Moore's Brook at Moran St., one at Morris Lake Rd., Spart, and other over Lake Lackawanna Inlet, Byram Twp., to J. W. Rogers, Main St., Succasunna. Est. $25,000. Noted May 14.

N. J., Shrewsbury — Bd. Freeholders Monmouth Co., Court House, concrete, steel hy. bridge over Central R.R. tracks on Shrewsbury Ave., to S. S. Thompson Co., Red Bank, $39,790. Noted Apr. 23.

N. J., Teaneck—State Hy. Comn., Trenton, bridge to carry Route 4, Sect. 3 over Teaneck Rd., to L. B. Cleveland, Graybar Bldg., New York, $43,845. Noted May 21.

New York and New Jersey—Port of New York Authority, 80-90 8th Ave., electrical equipment and installing on George Washington Bridge over Hudson River, to Beach Electric Co., 81 Wallace St., Newark, N. J., $75,487. Noted May 7.

N. Y., New York—A. Goldman, comr. Plant & Structures, Municipal Bldg., bracing columns Washington Bridge over Harlem River, to Vulcan Rail & Constr. Co., Maspeth, $59,442. Noted May 14.

Oregon—State Hy. Dpt., Salem, 405 ft. bridge over Elk Creek, Douglas Co., to Hargraves & Linsey, Eugene, $42,936; 222 ft. bridge over Cape Creek, Oregon Coast Hy., Lane Co., to Clackamas Constr. Co., Tillamook, $49,653.

Pennsylvania — State Hy. Dpt., Harrisburg, 341 ft. structural steel rein.-con. viaduct, incl. 108 ft. deck truss span, four 45 ft. rein.-con. beam spans, 30 ft. roadway, two 6 ft. sidewalks, space for 1 trolley track, Route 108, Heidelberg Boro, Allegheny Co., to M. E. Lutz, 337 Bellflower Ave. N. E., Canton, O., $135,095. Noted Apr. 2, under "Streets and Roads."

B. C., North Vancouver—Burrard Inlet Bridge & Tunnel Co. Ltd., North Vancouver, replacing 300 ft. span bridge, 35 ft. over 2nd narrows that was damaged by ship, incl. 14 in. road and single railway track, to Dominion Bridge Co. Ltd., 275 West 1st Ave., Vancouver, $162,394. Noted May 28.

Ont., Cornwall—Stormont, Dundas and Glengarry Counties, 76 ft. span hy. bridge at Williamstown and 29 ft. span bridge in Cornwall Twp., to Ontario Bridge Co. Ltd., Crown Office Bldg., Toronto. Est. $25,000.

STREETS AND ROADS

BIDS ASKED

Alabama—June 25, by L. G. Smith, dir. hys., Montgomery, sheet asphalt, concrete, asphaltic concrete or rock asphalt paving 54,000 sq.yd. by, Montgomery Co.

Alabama—June 30, by L. G. Smith, dir. hys., Montgomery, grading, shoulders, concrete, sheet, rock asphalt or bitulithic concrete paving 24,800 sq.yd. Tuskegee-Montgomery Rd., Federal Aid Project 201B, Macon Co.; 35,500 sq.yd. Demopolis Rd. towards Moscow Bridge, Federal Aid Project 188B-1, Marengo Co.

California—Joint Hy. Dist. 17, El Centro, rejected bids May 17, surfacing, oiling 7.5 mi. Julian-Kane Springs Rd., San Diego and Imperial Counties.

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California—June 17, by C. H. Purcell, engr. State Hy. Comn., Sacramento, bituminous treating 32 mi. road between Weaverville and Tower House, Trinity and Shasta Counties—concrete surfacing, grading 4.1 mi. road from point 4 mi. south of Williams and Williams, Colusa Co. —bituminous treated crusher run gravel or stone (plant mixed) on crusher run base 8.8 mi. road between Truckee and Hinton, Nevada Co.—12.9 mi. road between Sonora Junction and point 4 mi. south of Coleville, Mono Co.

California—June 24, by State Hy. Comn., Sacramento, bituminous treated gravel surfacing 8.4 mi. road between Big Lagoon and Freshwater Lagoon, Humboldt Co.—bituminous treating 20 mi. road beteewn airport and Soda Springs, Placer and Nevada Counties—grading, timber bridges, screened gravel surfacing 2.3 mi. road between Dry Creek Bridge and Christine, Mendocino Co. C. H. Purcell, hy. engr.

California—Bd. Directors District, at Riverside, bids about July 8, clearing, grubbing, grading, drainage structures, channel change, retaining walls, culverts, grading 355,000 cu.yd. Ortega Hy., Riverside and Orange Counties.

Calif., Los Angeles—Bd. P. Wks., City Hall, rejected bids, grading, sanitary sewers, waterworks, ornamental lighting system, 7 in. concrete paving 525,000 sq.ft. 120th St. and Bway. Impvt. Dist.

Calif., San Francisco — June 17, by S. J. Hester, secy. Bd. P. Wks., asphaltic concrete paving safety islands, Van Ness Ave. extension. $40,000.

Connecticut—June 15, by J. A. MacDonald, state hy. comr., Hartford, bituminous macadam paving 1,293 ft. by Greenwich and Norwalk—4,476 ft. New Britain—asphalt on concrete paving 1,000 ft. hy. East Hartford—waterbound macadam paving 8,203 ft. Bridgewater—4,765 ft. Oxford—waterbound macadam paving and bridge, 13,185 ft. Killingly and Pomfret—trap rock waterbound macadam paving 6,170 ft. Cromwell—3,200 ft. East Hartford—6,100 ft. Haddam—4,150 ft. hy. and bridge, Newington—removal and disposal of section concrete trolley bridge on Sachem's Head Rd., Guilford —2 bridges and gravel surfacing 817 ft. Rubber Ave., Naugatuck—72 in. rein.-con. pipe culvert, Route 4, Sharon; adv. E.N.-R. June 11.

Conn., New Britain—June 14, by City, paving East St. (State Aid). $25,000. W. Meriam, City Hall, engr.

Idaho — June 16, by A. Harbour, comr. P. Wks., Boise, grading, crushed graveling 11,200 cu.yd. Idaho Central Hy. from Fairfield East, Camas Co.—15,500 cu.yd. Idaho-Montana Hy. Jefferson and Clark Counties—13,200 cu.yd. Roosevelt Hy., Booneville Co.

Ill., East St. Louis—City Council soon takes bids "White Way" street lighting system, widening, asphalt on concrete repaving 7 blocks Bway. from 3rd to 10th St., 38 and 50 ft. $60,000. W. McKBrown, City Hall, engr.

Ill., Lincoln—June 13, by Bd. Comrs. Logan Co., grading 6.6377 mi. Sect. 1A-M. F. T., 30 ft. G. H. Baker, c/o State Hy. Dpt., Springfield, engr. county roads.

Indiana — June 16, by State Hy. Comn., Indianapolis, puddled macadam bituminous coated aggregate or bituminous retread surfacing 9.564 mi. Contr. 136, State Rd. 6 from Clinton-Howard Co. line Rd. to U. S. Rd. 31, Howard Co. — 17.871 mi. Project F. A. 272, Sects. A and B, State Rd. 9 from Huntington north, Huntington and Whitley Counties—14.883 mi. Project F. A. 274, Sects. A and B, State Rd. 59 from Clay City to Brazil, Clay Co.—grading, drainage structures 7.15 mi. Contr. 137, State Rd. 31 from Kokomo south, Howard and Tipton Counties—rock asphalt, bituminous concrete or asphaltic macadam surfacing 2.375 mi. Contr. 153, State Rd. 27 north from Berne, Adams Co. J. J. Brown, dir.

Ind., Evansville — June 18, by Bd. Comrs. Vanderburgh Co., asphaltic concrete surfacing 1st Ave. Rd. $27,487; Rose Avenue Rd. $20,749. E. D. Koenemann, Evansville, co. aud.

Ia., Grundy Center—June 16, at office Auditor Grundy Co., maintenance gravel surfacing 13 mi. Colfax Center, German Center and Pleasant Valley Center Rds.

Kan., Ottawa—June 18, by J. R. Finley, clk. Franklin Co., grading, culverts, light type surfacing 7.5 mi. Project B.D. 12-C, Michigan Valley Rd., 26 ft. E. Loveless, County Court House, engr.

La., St. Francisville—June 16, by Bd. Supervs. Dist. 4 of West Felicia Parish, grading, drainage structures 3.83 mi. roads.

Maryland—June 16, by State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 1.57 mi. of Contr. B-197-44, Baltimore Co.—1.04 mi. Contr. Cl-96-52, Carroll Co.—1.52 mi. Contr. Ce-110-24, Cecil Co.—concrete shoulders, 7.62 mi. of Contr. Wo-101-111, Worcester Co.—macadam paving 1.52 mi. of Contr. H-123-42, Harford Co.—gravel surfacing 2.27 mi. of Contr. SM-83-84, St. Mary's Co.; adv. E. N.-R. June 11.

Massachusetts—June 16, by Dpt. P. Wks., State House, Boston, bituminous macadam paving 10,093 ft. hy. constructing steel stringer, concrete bridge over Boston & Maine R.R., and rein.-on. pile bridge, Pepperell; rein.-con. and bituminous macadam (dual type), paving 31,-290 ft. hy., incl. 2 span steel stringer, concrete bridge and rein.-con. extension to 2 bridges, Andover, North Reading and Reading. A. W. Dean, Dpt. P. Wks., Boston.

Massachusetts—June 16, by Dpt. P. Wks., State House, Boston, A. W. Dean, Dpt. P. Wks., engr., bituminous macadam paving 5,900 ft. hy. Wenham—9,760 ft. Sharon—gravel and bituminous macadam paving 5,295 ft. West Newbury—3,300 ft. Carlisle.

Mass., Boston—June 12, by Dpt. P. Wks., sheet asphalt or bitulithic paving Holsworthy St., Ward 12. $25,000. J. A. Rourke, comr. Dpt. P. Wks.

Mass., Boston—June 15, by Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt or bitulithic paving Pembroke St., etc., Wards 3, 4, 8 and 9, $30,000.

Michigan—June 16, by J. T. Sharpensteen, div. engr., Escanaba grading, shaping, drainage structures, 20 ft. concrete surfacing, 4.721 mi. FO17-35C-1 and 2.389 mi. FO17-33C-2, Chippewa Co., for State Hy. Comn., Lansing.

Michigan — June 16, by J. T. Sharpensteen, div. engr., Escanaba, grading, drainage structures 9.741 mi. FO22-26 Contr. 1, Dickinson Co., for State Hy. Comn., Lansing.

Michigan — June 16, by J. T. Sharpensteen, div. engr., Escanaba, grading, shaping, drainage structures, concrete surfacing 2.085 mi. FO52-23, Contr. 1, Marquette Co., 20 ft., for State Hy. Comn., Lansing.

Michigan—June 17, by W. J. Kingscott, div. engr., 309 McNair Bldg., Kalamazoo, shaping, 20 ft. concrete surfacing 3.197 mi. FO39-13C-4 and MO39-13C-5, Kalamazoo Co., for State Hy. Comn., Lansing.

Michigan—June 18, by H. W. Hagaman, div. engr., 504 Eddy Zldg., Saginaw, grading, shaping, drainage structures, 20 ft. concrete paving 9.028 mi. FO18-13C-2, FO37-18C-1 and FO56-20C-1, from Clare to Coleman, Clare, Isabella and Midland Counties, for State Hy. Comn., Lansing.

Michigan—June 18, by H. G. Oakes, div. engr., Plymouth, grading, shaping, drainage structures, 20 ft. concrete paving 7.277 mi. FO46-20, Contr. 1, Lenawee Co., for State Hy. Comn., Lansing.

Minnesota—June 16, by State Hy. Dpt., St. Paul, grading, paving (state furnishes cement) 4.3 mi. S.P. 3-43-B and 3-60, Sect. 1—6.2 mi. S.P. 20-27—grading 8.6 mi. S.P. 2-35—6.8 mi. S.P. 9-22—16.5 mi. S.P. 11-39, Sect. 2—6.9 mi. S.P. 25-22, Sect. 3.

Minn., Minneapolis—June 15, by A. P. Erickson, aud. Hennepin Co., Court House, grading 3.3 mi. Co. Project 829, S. A. P. 13, Sect. 1; 2.3 mi. Sect. 2 same road. $25,727. W. E. Duckett, co. hy. engr.

Mo., Kansas City—June 16, by Comrs. Jackson Co., Court House, furnishing, applying 2,000,000 gal. road oil during 1931. L. E. Koehler, Court House, co. engr.

Mo., St. Louis—June 23, by Bd. P. Serv., City Hall, asphalt paving 7,410 sq.yd. Westminster Pl., 51,600—asphaltic concrete paving 3,430 sq.yd. Tholozan Ave., $33,060—warrenite bitulithic paving 2,935 sq.yd. Wyoming St., from Jefferson to Iowa Aves., $26,800—2,860 sq.yd. Wyoming St., from 13th St. to Lamp Ave., $16,320. W. W. Horner, city engr.

Mo., St. Louis—June 30, by Bd. P. Serv., City Hall, asphalt paving 5,715 sq.yd. Mimika Ave., $35,200—5,850 sq.yd. Wyoming St. from Lemp St. to Jefferson Aves., $34,080—5,220 sq.yd. Taylor Ave., $31,320 — warrenite bitulithic paving 7,360 sq.yd. Wyoming St. from Iowa to Gravois Aves., $42,920 — grading, concrete paving alleys in City Blocks 1657, 2802 and 5224, $8,720. W. W. Hroner, city engr.

New Jersey—June 22, by State Hy. Comn., Trenton, conduits, pole founds., transfer pits, on Routes 1, 4 and 6, Sect. 6, Christie's Lane to Fort Lee Bridge Plaza, Bergen Co. A. L. Grover, ch. clk.; adv. E. N.-R. June 11.

New Jersey — June 29, by State Hy. Dpt., Trenton, grading, 9 in. rein.-con. paving 29,925 sq.yd. Route S-3, Sect. 2, Erie R.R. (Allwood) to Hepburn Rd., Clifton, Passaic Co.—grading, 8 in. rein.-con. paving 32,255 sq.yd. Route 42 Sect. 6-A, Route 50 Grade Separation and bridge over Watering Branch, Atlantic Co.—structural steel and ramp connections Route 25, Connecting Link, Sect. 1, Route 25, Sect. 3, Contr. 49, Jersey City, Hudson Co. A. L. Grover, ch. clk.; adv. E. N.-R. June 11.

N. J., Cedar Grove—June 15, by Twp. Com., Municipal Bldg., bituminous macadam penetration paving Union St. $25,000. Boghton & Lawson, 843 Broad St., Newark, engrs.

N. J., Newton—June 30, by Bd. Freeholders Sussex Co., County Administration Bldg., grading, 9 in. rein.-con. paving 43,989 sq.yd. Route S-31, Sect. 2, Newton to Ross' Corner. H. Snook, County Administration Bldg., co. engr.; adv. E. N.-R. June 11.

N. Y., Brooklyn—June 17, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, grading, 3 in. asphalt block on 6 in. concrete paving Brooklyn Ave.—grading, flagging Avenue U, West 3rd St., Nostrand and Voorhies Aves.—grading, bituminous concrete paving Avenue U, Banner Ave., East 6th, East 7th, East 14th, East 15th Sts.—grading, asphalt on concrete paving Avenue J, Linden Blvd., Church, Sheffield, 20th Aves., East 29th, East 42nd, East 48th, East 49th, Johnson, Lake, President, Starr, West 4th Sts.—sidewalks on Ridge Blvd.

N. Y., Buffalo—June 18, by W. Rathman, city comr., Municipal Bldg., repairing, asphalt pavements maintained by Dpt. P. Wks., from July 1, 1931 to June 30, 1932—paving Edison and Phyllis Aces.—repaving Connecticut St. and street railway area in Normal Ave. and Edison Ave.

N. Y., Long Island City—June 15, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., grading, curbing, sidewalks, sheet asphalt on concrete paving 38th, 39th, Jamaica, and Atlantic Aves., 166th, 24th, 110th, 71st, 63rd and 28th Sts.

Streets and Roads (Continued)

N. Y., New York—June 18, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., sheet asphalt on concrete paving Mace, Matthews and Gleason Ave.—granite block on concrete paving Park Ave.—curbing, sidewalks on Tilden St., Bartow and Throop Ave.—repairing sidewalks various locations.

O., Cleveland—June 12, by Bd. Comrs. Cuyahoga Co., stone curbing, earth shoulders, 4 in. drain tile guttering, 8 in. rein.-con. widening 7,900 sq.yd. Warrensville-Centre Rd. $23,673; Eddy Rd. to Lake Shore Blvd. to exceed $25,000. F. Williams, Court House, engr.

Pennsylvania—June 25 and 26, by State Hy. Dpt., Harrisburg, constructing 72 mi. roads in Beaver, Bedford, Somerset, Berks, Schuylkill, Centre, Chester, Northumberland, Huntingdon, Jefferson, Northampton, Snyder, Susquehanna, Warren, Wayne, Westmoreland and York Counties; bridge in Columbia and Lycoming Counties. S. S. Lewis, secy.; adv. E. N.-R. June 11.

Pa., Ford City—June 15, by City Clerk, grading, curbing, guttering, sewers, 7 in. rein.-con. surfacing 3,500 sq.yd. Hill Rd. R. M. Douglass, 912 Columbia Bank Bldg., Pittsburgh, engr.

Pa., Phila.—June 16, by Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., Schedule A, asphalt paving (assessment work), Walnut St., from Limekiln to Woolston Sts.—Schedule B, asphalt repaving Media St., from 52nd to 56th Sts., Westmoreland St., from Broad to 17th Sts., 4th St., from Thompson to Girard Sts.—Schedule C—redressed granite block repaving 18th St. (track area), from Wharton to Reed Sts., and from Ritner to Shunk Sts.—Schedule D, furnishing, delivering electrical supplies.

Tex., Marshall—Taking bids improving 16 streets, 21,940 ft., curbing and guttering, 65 storm sewer catch-basins, 17 manholes, 7,448 ft. storm sewer pipe, 48,220 yd. alternate types paving. $140,000. W. C. Albright, Marshall, engr.

Virginia—June 23, by State Hy. Dpt., Richmond, grading, drainage structures, macadam surfacing 35,450 sq.yd. Richmond Creek-West Virginia State Line Rd., Route 23, Project S-461-A1, Giles Co.—26,735 sq.yd. Winchester-West Berryville Rd., Route 38, Project S-593-HI, Frederick Co.—2,011 mi. approaches, Route 10, Project F-603-F, Smyth Co.—grading, drainage structures, clearing, grubbing, gravel surfacing approaches, Route 502, Project S-574-D, Princess Anne Co. H. G. Shirley, hy. comr.; adv. E. N.-R. June 11.

Washington—June 16, by S. J. Humes, dir. State Hy., Olympia, concrete paving 3.6 mi. State Rd. 9, Rochester Rd. W., Emergency F. A. P. 179-B, Thurston and Grays Harbor Counties—grading 3.2 mi. State Rd. 9, Fairholm W., Emergency F. A. P. 170-D, Clallam Co.—rein.-con. bridge over Chehalis River at Pe Ell, State Rd. 12, Emergency F. A. P. 131-F, Lewis Co.

Wash., Port Townsend—June 17, by Comrs. Jefferson Co., 4 mi. Upper Hoh River Rd. S. B. Edwards, Port Townsend, co. engr.

Wash., Seattle—Comrs. King Co., bids about June 18, graveling 10 mi. Eagle Gorge-Kansaket Hy. T. D. Hunt, Seattle, co. engr.

Wash., Seattle—City bids about June 29, either rein.-con. paving, trestle supported by creosoted piling with rein.-con. caps, or wharf seawall paving of piles timbers and sheet steel piling, on Railroad Ave. $750,000. R. H. Thomson, city engr.

Wisconsin—June 16, by State Hy. Comn. and Hy. Comrs., Chippewa, Clark, Pepin, Pierce, St. Croix and Taylor Counties, 213 South Barstow St., Eau Claire, furnishing, applying 155,000 gal. asphalt Type C, Chippewa Co.—130,000 gal. Clark Co.—83,000 gal. Pepin Co.—137,000 gal. Type C and 20,500 gal. Type F or tar Type C, Pierce Co.—62,000 gal. type C, St. Croix Co.—98,000 gal. Type C, Taylor Co.

Wisconsin—June 17, by State Hy. Comn. and Hy. Com. Oneida Co., Rhinelander, concrete paving 50,813 sq.yd. Three Lakes-North County Line Rd. H.T.H. 26; bituminous surfacing 12,000 Minocqua-Woodruff Rd., U. S. Hy. 51, S.A.P. 7889, Oneida Co.

Wisconsin—June 19, by State Hy. Comn. and Hy. Com. Monroe and Juneau Counties, Madison, grading 10.96 mi. Camp Douglas-Tomah-Sparta Rd., U. S. Hy. 16, F.A.P. 325-F, Monroe Co.—$0.245 mi. ap proaches to West Oakdale Overhead. U. S. Hy. 16, F.A.P. 325-D, Monroe Co.—8.203 mi. New Lisbon-West Co. Line Rd., U. S. Hy. 15, F.A.P. 325-C, Juneau Co.

CONTRACTS AWARDED

Arizona—State Hy. Comn., Phoenix, grading, oil processing road mix 7.2 mi. Blythe-Wickenburg Hy., to Lee Moor Contg. Co., 909 North Hoff St., Tucson, $152,654; 2.75 mi. Benson-Vail Hy., to R. H. Martin, Tucson, $54,129.

California — State Hy. Comn., Sacramento, bituminous macadam on crusher run base surfacing 1 mi. road in Santa Cruz Co., to C. W. Wood, Stockton, $42,084—heavy fuel oil surfacing 3.5 mi. shoulders, Monterey Co., to Granite Constr. Co., Watsonville, $4,976—25 mi. Calaveras and Tuolumne Counties, to Basalt Rock Co., Napa, $12,525 — grading 0.7 mi. Mono Co., to Kennedy-Bayles Constr. Co., Biggs, $5,290. Grand total $64,875.

California—C. H. Purcell, engr. State Hy. Comn., Sacramento, grading, concrete surfacing 7.2 mi. road in Sacramento Co., 20 and 30 ft., to Basic Bros. Constr. Co., Torrence, $199,365—grading, bituminous treated crushed gravel or stone surfacing 3.5 mi., also widening small rein.-con. bridge, San Joaquin Co., to C. W. Wood, Stockton, $44,660. Noted May 7.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, sidewalks, storm drains, sanitary sewers, 8 in. warrenite bitulithic paving 255,000 sq.ft. Sepulveda Blvd. from Beverly to Wilshire Blvds., to Hollywood Paving Co., 8525 West 3rd St., $92,250.

Calif., Los Angeles—Bd. Comrs. Los Angeles Co., improving 1,304 ft. New Hampshire Ave., to L. Honek, 2941 Denby Ave., $28,826.

Calif., Los Angeles—Bd. P. Wks., City Hall, curbing, guttering, sidewalks, sewers, 7 in. compressed concrete paving 200,000 sq.ft. Hoover Blvd. from 32nd St. to Exposition Blvd., to Griffith Co., Railway Bldg., $89,927.

Calif., Los Angeles—Bd. Comrs. Los Angeles Co., grading, storm drains, curbing, sidewalks, asphaltic concrete surfacing Wilmington-San Pedro Rd. between B St. and Pacific Ave., to Griffith Co., Railway Bldg., $123,661.

Colorado—State Hy. Dpt., Denver, gravel surfacing 2.5 mi. State Hy. 2, in Byers Canon west of Hot Sulphur Springs, to F. L. Hoffman, D.A.C. Bldg., Denver, $16,357; 5 mi. State Hy. 10, east of Bayfield, Archeluta Co., to Word, Morgan & Burnett Constr. Co., Durango, $66,921.

Colo., Denver—Dpt. Impvts. & Parks, widening Larimer St., paving from Speer Blvd. to Bway., to New Mexico Const. Co., 4080 Gipago St., $55,246—widening Wazee St. from Cherry Creek to 19th St., to Collier-Larimer, Inc., $24,374—paving from 19th to 20th Sts. and on 20th St. from Wazee to Blake Sts., to J. B. Bertrand, Inc., Union Station, $10,567. Grand total $90,187.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, to C. E. Carson Co., 601 St. Clair St., Chicago, paving roads in Henry Co. $374,033—to J. Mackler & Co., Chicago Heights, Route S.A. 55, Sect. MR Cook Co. $10,444—to Casey Constr. Co., Casey, Jackson Co., $75,143; Marion Co. $9,270—to Hartman-Clark Co., 920 Peoria Life Insurance Bldg., Peoria, Macon, DeWith and Piatt Counties, $229,889; Macon Co. $188,599—to Sangamo Constr. Co., Springfield, Route 4, Sect. DRS Sangamon Co. $16,522; Route 4, Sect. LRS Sangamon Co. $23,159—to Keeley Bros. Constr. Co., 2100 State St., East St. Louis, Madison Co. $23,271—to C. J. Moritz, Inc., Effingham, Richland and Clay Counties $39,563—to Booth & Gilchrist, Gardner, Grundy Co. $12,344—to Powers Thompson Constr. Co., Joliet, Route 49, Sect. 142X-1, $4,922; Route 49, Sect. 143V-X, $12,678, both Will Co.—to Gund-Graham, Freeport, Ogle Co. $100,973—to Hanes & Kilgo, Alton, Macoupin Co. $116,247—to French Constr. Co., Fairfield, Route 142, Sect. 112, Jefferson Co. $7,561—to Regenhardt Constr. Co., Cape Girardeau, Mo., Route 142, Sect. 113X, Jefferson Co. $8,931—to Pronger Bros., Blue Island, Route 53, Sect. 537X, $27,108; Route 22, Sect. 11Y, $24,772, both Cook Co.; Dupage Co. $215,658—to McCarthy Impvt. Co., Kahl Bldg., Davenport, Ia., Winnebago and Boone Counties, $118,638; Ogle Co. $147,909—to Cameron-Joyce Co., Keokuk, Ia., Rock Island Co., $151,490; La Salle Co., $124,197—to Jaicks Bros., 77 West Washington St., Chicago, Morgan and Scott Counties, $111,304—to A. J. Shanks Constr. Co., Watseka, La Salle Co. $85,555—to W. J. Sheppard Co., 1412 Altgeld St., Chicago, grading, drainage structures, Lake Co. $11,358—to E. H. Oltendorf, Palatine, La Salle Co. $12,323 — to Willis Constr. Co., St. Louis, Mo., Franklin and Williamson Counties, $50,542—to F. E. Lefferdick, Lincoln, Effingham Co. $69,409; Jackson Co. $61,253—to D. Lango, Chicago, Cook Co. $13,702. Grand total $2,478,767.

Illinois — Rio Twp., furnishing, spreading gravel on 17.5 mi. roads, to R. A. Culinan, Tremont, at $1.48 per ton, Est. $30,000.

Ill., Belleville—Bd. Comrs. St. Clair Co., grading, 5.9079 mi., 28 culverts one 34 ft. bridge, Sect. 80A-15d and Sect. 80B-15d, to Tritt Bros., 17A North Illinois St., $53,360.

Ill., Benton—Franklin Co., 4 in. gravel surfacing with two 6 ft. earth shoulders 3.412 mi. State Route 3, Sect. 7, between Akin and Benton, 18 ft., to Barnett & McCoy, Eldorado, $23,589.

Ill., East St. Louis—Widening, asphalt paving North 5th St., from Bway. to Ohio Ave., to Keeley Bros. Contg. Co., 4301 State St., $58,563. Est. $60,000.

Ill., Hillsboro—Montgomery Co., hardsurfacing 6.5 mi. road between Taylor Springs and Coffeen, to T. Cruze, Peoria, $29,290.

Indiana—State Hy. Comn., Indianapolis, grading, drainage structures concrete surfacing 143,041 sq.yd. Racoon-Crawfordsville Rd., Montgomery and Putnam Counties, to Berns Constr. Co., 1401 New City Trust Bldg., Indianapolis, $198,567. Est. $253,674. Noted Apr. 23.

Ind., Indianapolis—Bd. P. Wks., concrete surfacing Montclair St., to R. M. Bowen Co., 4430 Carrolton St., $12,964; resurfacing Pennsylvania St., to Union Asphalt Constr. Co., 208 Lemcke Bldg., $18,162.

Ind., Madison — Jefferson Co., concrete surfacing 25,170 ft. O. Deputy Rd., to Miles & Thomas, Madison, $17,995. Est. $26,922. Noted Apr. 23.

Ind., Marion—Grant Co., concrete surfacing C. L. Bockmier Rd., to P. B. Putman, 2222 Kensington St., Ft. Wayne, $20,500. Est. $27,400.

Ind., South Bend—St. Joseph Co., concrete surfacing Ice Rd., to Williston Constr. Co., South Bend, $79,300. Est. $110,000. Noted May 21.

Iowa—State Hy. Comn., Ames, grading, drainage structures, paving 0.893 mi. roads in Des Moines Co., to M. W. Daly Constr. Co., Burlington, $24,888 — 9.44 mi. Fremont Co., to Moran Constr. Co., 2915 North 16th St., Omaha, Neb., $180,072—0.27 mi. Lucas Co., to Reed & Wheelock, Clay Center, Kan., $8,906—0.91 mi. Winnebago Co., to Booth & Olson, Inc., 620 Insurance Exch. Bldg., Sioux City, $18,843—gravel surfacing 1.31 mi. P-471 and 9.16 mi. F-263, Benton Co., to DeWees & Whitney, Springville, $995 and $7,557 respectively—10 mi. F-144 and 8.4 mi. P-533, Jackson Co., to McDougall Constr. Co., 3927 Floyd Ave., Sioux City, $6,295 and $5,288 respectively—27.449 mi. P-532 Jackson Co., to H. N. McCoy, Waterloo, $17,705—1.9 mi. Marion Co., to Sargent Bros., 2615 1st St., Des Moines, $2,877—2.232 mi. O'Brien Co., to Evans Constr. Co., Early, $955—10.822 mi. Winneshiek Co., to M. O. Weaver, Iowa Falls, $17,506—riprap F-303 and 257, Tama Co., to L. Flumb, Wapello, $1,881 and $1,849 respectively. Grand total $295,597. Noted May 21.

Ia., Sioux City—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

Ia., Cedar Rapids—Linn Co., grading, casting 5,678 mi. Projects P and R, to B. C. Johnson, Cedar Rapids, $6,895; 10,950 ft. 15- to 42-in. corrugated culvert pipe, to Iowa Pipe & Culvert Co., Cedar Rapids, $16,635. Rejected bids grading, castings 7.416 mi. Projects Q. Y and Z. W. H. Behrens, Court House, engr.

Ia., Clinton—Bd. Comrs. Clinton Co., grading secondary roads, to Foley Bros., Ansmosa, $36,064.

Ia., Davenport—Scott Co., grading 8 mi. Argo-Princeton Rd., 9.5 mi. Le Claire Big Rock Rd., 10 mi. Walcott-Buffalo Rd., to Jenner & Lister, Davenport, $23,890.

Ia., Le Mars—Plymouth Co., grading 12.6 mi. trunk roads, to O'Hanlon & Reilly, Omaha, Neb., $22,843; bridge work, to Christenson Bros., Tyler, Minn., $14,391.

Ia., Montezuma—Bd. Comrs. Poweshiek Co., improving 24.07 mi. roads, grading, to G. McDonald, Mankato, Minn., $25,260—to Connor & Kuehn, Hampton, $6,728—concrete culverts, extensions, Groups 1 and 3, to Indianola Constr. Co., Indianola, $8,399—Groups 2A and 4A, to Wilson Constr. Co., Red Oak, $2,050. Grand total $42,437. Noted Apr. 30.

Ia., Mt. Pleasant—Henry Co., grading 9.056 mi. secondary roads, to P. Patik, Cedar Rapids, $11,132; 4.39 mi. Rd. N, to W. W. Cummins, Ottawa, $7,356.

Ia., Primghar—O'Brien Co., grading incidental work 12 mi. local roads, to C. W. McNamara, Sioux Falls, S. D., $14,096. Noted Apr. 16.

Ia., Sigourney — Bd. Comrs. Kossuth Co., gravel surfacing secondary roads, to Paul & Donnelly, Ft. Dodge, $31,645.

Ia., Waterloo—Black Hawk Co., grading 11.25 mi. local roads, to Clear Lake Constr. Co., Clear Lake, $17,018. Noted Apr. 16.

Kansas — State Hy. Comn., Court House, Eureka, grading, culverts 8.046 mi. Kansas Project 96, Federal Aid Project 396-D, Greenwood Co., to S. W. Poor & Son Constr. Co., Topeka, $64,044. Noted May 14.

Kentucky — State Hy. Dpt., Frankfort, to F. G. Breslin, 32nd and Market Sts., Louisville, bituminous surface treating and surface mix treating roads in Group 1, Henry, Oldham, and Owen Counties $27,804—to Southern Oil & Tar Co., Clay St. and River Rd., Louisville, Group 2, Spencer and Shelby Counties $17,364; Group 4, Garrard, Lincoln and Mercer Counties $47,372; Group 8, Bell, Laurel, Rockcastle and Whitley Counties $26,927; Group 9, Greenup, Boyd and Carter Counties $24,027 — to Carr-Reed Co., Lexington, Group 3, Washington, Lincoln, Boyle and Marion Counties $28,049 — to Eaton Oil Wks., Group 5, Boone and Grant Counties $1,277; Group 7, Bath, Nicholas, and Fleming Counties, $22,793—to R. B. Tyler Co., 1446 Levering St., Louisville, Group 6, Harrison and Nicholas Counties $10,484. Grand total $196,097. Noted May 21.

Kentucky—State Hy. Dpt., Frankfort, grading, drainage structures 8.939 mi. road in Clinton Co., using 1st class rein.-con. pipe, to Clinton Rd. Co., Albany, $58,712; 11.511 mi. Lyon and Caldwell Counties, to Lebanon Bridge Co., Gallatin, Tenn., $68,636. Noted Apr. 9.

Kentucky—State Hy. Dpt., Frankfort, grading, drainage structures 7.67 mi. road in Caldwell Co. and 4.648 mi. Calloway Co., to Bell & Bell, 101 Broad St., Nashville, Tenn., $51,585 and $29,027 respectively—11.346 mi. Lee Co., to Dicus Bros., Waynesville, N. C., $69,382—11.395 mi. Marshall Co., to Kaiser Transportation Co., Buechel, $77,952 — 7.699 mi. Owen Co., to Thomas-Ruth Co., Frankfort, $35,023. Grand total $262,969. Noted Apr. 30.

Kentucky — State Hy. Dpt., Frankfort, rock asphalt-waterbound macadam base surfacing 8.829 mi. Louisville-Paducah Rd., Crittenden Co., to Raymond Contg. Co., Bowling Green, $144,292. Noted Feb. 12.

Maryland — State Roads Comn., Baltimore, G. C. Uhl, chn., sheet asphalt paving 0.45 mi. Contr. BC-103-72, Baltimore City, to Baltimore Asphalt Block & Tile Co., 1320 North Monroe St., Baltimore, $31,713; concrete surfacing and channel excav. of Anacostia River, 2.16 mi. Contr. P-164-311, Prince Georges Co., to L. R. Colbert, Fredericksburg, Va., $89,586. Noted May 14.

Maryland — State Roads Comn., G. C. Uhl, chn., Baltimore, sheet asphalt paving 0.37 mi. Contr. BC-104-74, Baltimore City, to P. Flanigan & Sons, Harford Rd. and Baltimore & Ohio R.R., Baltimore, $35,661.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, macadam paving 1.09 mi. Contr. Ho-46-54, Howard Co. to Thomas, Bennett & Hunter, Westminster, $37,151. Noted Apr. 30.

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Streets and Roads (Continued)

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 1 mi. Contr. B-183-44, Baltimore Co., to P. Reddington & Son, 2 East Lexington St., Baltimore, $16,531. Noted Apr. 23.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., concrete paving 3.89 mi. Contr. H-108-44, Harford Co., to Harry T. Campbell & Sons, Towson, $72,942. Noted Apr. 2.

Massachusetts — Dpt. P. Wks., A. W. Dean, engr., State House, Boston, bituminous macadam paving 19,685 ft. hy. Monterey, to J. D. Michael & Bros., Torrington, Conn., $91,310—6,099 ft. Ludlow, to Adams & Ruxton Constr. Co., 1387 Main St., Springfield, $18,022—gravel and bituminous macadam paving 2,782 ft. Freetown, to Atwood-Thomas Constr. Co., Middleboro, $5,811—3,400 ft. Sterling, to Perini & Ampollini, 242 Waverly St., Framingham, $18,637 — 5,300 ft. Boxford, to A. Susi, 68 Cedrus Ave., Roslindale, $17,786—bitulithic concrete paving 1,918 ft. West Bridgewater, to O. R. Mann, South Hanover, $6,129. Grand total $157,695. Noted May 21.

Massachusetts—Dpt. P. Wks., State House, Boston, bituminous macadam paving 4,500 ft. hy. Hanson, and 2,215 ft. Mansfield, to Arute Bros., 413 Main St., New Britain, Conn., $17,770 and $19,795 respectively—8,772 ft. Topsfield, to S. Triconi, 93 Warren St., Waltham, $45,437—3,000 ft. Milton, to A. DeStefano, Inc., 288 Summer St., East Boston, $30,069—8,914 ft. Salisbury, to J. E. Watkins, 10 Fern Ave., Amesbury, $16,904. Grand total $129,975. Noted May 14.

Mass., Boston—Park Dpt., 33 Beacon St., concrete walks, Louis Pasteur Ave. and Back Bay Fens, to Boston Granolithic Co., 32 Hull St., $22,221. Est. $25,000.

Mass.—Lawrence—City, granolithic and artificial stone sidewalks, curbings, to Heinrich Co., 15 Colby St., at $2.05 per sq.yd. and $1 per lin.-ft. respectively. Est. $25,000.

Michigan—A. L. Burridge, div. engr., Cadillac, grading, drainage structures 7.841 mi. FO35-12C-1, Iosco Co., to Pickett & Goodwin Bros., Allegan, for State Hy. Comn., Lansing, $65,392, incl. cement. Noted Apr. 30.

Michigan—W. J. Kingscott, div. engr., 213 Watson Bldg., Grand Rapids, grading, shaping, drainage structures, concrete paving 2.086 mi. FO34-10C-5, Ionia Co., to Lewis & Frisinger Co., Ann Arbor, for State Hy. Comn., Lansing, $68,064, incl. cement. Noted Apr. 30.

Michigan—H. C. Oakes, div. engr., Plymouth, grading drainage structures 4.173 mi. FO30-19C-1, Hillsdale Co., to H. E. Stroh, Garrett, Ind., for State Hy. Comn., Lansing, $44,471 incl. cement. Noted May 7.

Mich., Marquette—Marquette Co., grading hy. preparatory to gravel surfacing, to Northern Contg. Co., Norway, $11,635—relocating Huron Bay grade around bridges, to Alfred Lindberg & Sons, Ishpeming, $6,299—70 ft. span, rein.-con., steel bridge over Peschekee River, to W. Brumm, Marquette, $15,171. Grand total $33,105.

Mississippi—State Hy. Comn., Jackson, grading 3.75 mi. Collins-Magee Rd., Covington Co., to Knight & Wilson, Collins, $19,194; concrete surfacing above road, to Hartmann-Clark Bros. Co., 920 Peoria Life Bldg., Peoria, Ill., $72,401.

Mississippi—State Hy. Comn., Jackson, concrete surfacing 4 mi. Brookhaven-Prayer Hy., Lincoln Co., to Hartman-Clark Co., 920 Peoria Life Insurance Bldg., Peoria, Ill., $80,763. Noted May 14.

Mo., St. Joseph — Buchanan Co., grading, culverts 11.4 mi. road from Faucett to Gower, to Consolidated Paving & Material Co., 7th and Olive Sts.

Neb., Kimball—Grading, guttering, rein.-con. paving 11,310 sq.yd., to A. H. Read, Cheyenne, Wyo., $27,523.

Nevada—Director State Hy. Dpt., Carson City, grading, draining, surfacing 10.42 mi. Mineral Co., to Dodge Bros., Fallon, $65,017. Est. $77,730. Noted May 21.

Nevada—State Hy. Dpt., Carson City, oil mixed surfacing 12.16 mi. White Pine Co., to Basalt Rock Co., Inc., Napa, Calif., $22,582 est. $23,930; 7.68 mi. Ormsby and Lyon Counties, to J. Casson, Hayward, Calif., $16,815 est. $16,708. Noted May 7.

New Hampshire—State Hy. Dpt., Concord, 6 in. one course rein.-con. on 8 in. gravel base course surfacing 25,084 sq.yd. Daniel Webster Hy., Plymouth, to Portland Contg. Co., Portland, $101,470. Est. $123,000. Noted May 21.

N. J., Glen Rock—Bd. City Comrs., Municipal Bldg., grading, bituminous macadam paving Rodney St. extension, to Midland Constr. & Contg. Co., Inc., Rochelle Park, $11,708; sewers in same street, to P. Guiliani, 447 North Main St., Lodi, $17,060.

N. J., Ridgewood — Bd. Village Comrs., 20 Hudson St., bituminous macadam paving Barrington and Lotus Rds., Wilson Summit, Van Buren and South Broad Sts., to S. Braens Sons, Nelson St., Hawthorne. Est. $50,000.

N. J., Rumson—Boro Council, grading, rein.-con., on existing paving Fairhaven Rd., to Sost Contg. Co., 305 Whitford Ave., Nutley—oiling dirt streets, to F. McDonald, Asbury Park—sidewalks and curbs, to P. DePonto, Red Bank. Est. $25,000. Noted Apr. 30.

N. J., West Milford — West Milford Twp. Com., Twp. Hall. Newfoundland, grading, bituminous macadam penetration paving Union Valley Rd., Sects. 5 and 6, to Union Building & Constr. Co., 150 Prospect St., Passaic, $34,677.

New York—A. W. Brandt, comr. Hys., Albany, concrete paving 3.16 mi. and 3.27 mi. Albany Co., to New Haven Roads Constr. Co., 1827 Dixwell Ave., New Haven, Conn., $146,391 and $184,942 respectively, est. $203,335 and $120,404 respectively—3.2 mi. Suffolk Co., to Silliman Godfrey, 133 Admiral St., Bridgeport, Conn., $217,601 est. $293,747—6.83 mi. Jefferson Co., to F. Callahan, Auburn, $220,221 est. $311,843—3.37 mi. St. Lawrence Co., to Lane Constr. Co., 37 Colony St., Meriden, Conn., $141,235 est. $194,592—0.83 mi. Westchester Co., to Garafano Constr. Co., Mount Vernon, $131,828 est. $186,256—7.29 mi. St. Lawrence Co., to Belmar Contg. Co., Proctors Bldg., Troy, $285,534 est. $385,959—2.94 mi. Broome Co., to O. P. Williams Constr. Co., Inc., Oneonta, $118,360 est. $171,129—2.1 mi. Broome Co. and 3.23 mi. Cortland Co., to George Edgecomb Co., Walton, $114,267 and $148,798 respectively—est. $156,624 and $180,366 respectively—3.23 mi. Monroe Co. and 5.3 mi. Livingston Co., to Rochester Vulcanite Paving Co., Exchange Pl. Bldg., Rochester, $288,406 and $308,616 respectively, est. $417,545 and $139,396 respectively—4.88 mi. St. Lawrence Co., to Morris C. Speer, Seneca Falls, $171,242 est. $233,304—bituminous macadam paving 2.21 mi. Oswego Co., to M. B. Putnam, Auburn, $99,333 est. $139,396—bridge in Onondaga and Oswego Counties, to Peckham Constr. Co., Crosby Bldg., Buffalo, $138,306 est. $189,610. Grand total $2,615,080. Noted Apr. 27 and May 7.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, to Cranford Co., 52 9th St., asphalt paving Bergen St. $13,981; to D. J. McCoy Asphalt Co., Avenue U and East 57th St., Boerum St. $10,154; Court Sq. $3,840; Sheridan Ave. $15,103; Avenue T $2,657; 52nd St. $52,999; 90th St. $2,539—to Pomonok Asphalt Co., 1246 Grand St., Catherine St. $3,471; Briggs Ave. $8,598—to B. Turecamo Contg. Co., New Cropsey Lane, East 28th St. $7,309—to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., 12th St. $34,554—to Concrete Co., Metropolitan Ave., grading Avenue O, $3,020—to Slattery Contg. Co., 7202 51st St., Long Island City, Stanley Ave. $1,549—to A. Suriano, foot 24th Ave., Wolfe Pl. $5,315—to F. Mandatto, 201 Neck Rd., 28th Ave. $3,013. Grand total $168,102. Noted May 14.

North Dakota—State Hy. Comn., Bismarck, to Northwest Constr. Co., Fargo, graveling 7.751 mi. LaMoure Co. $6,593; 25.237 mi. Sioux and Morton Counties, $40,168; 16.216 mi. Bowman Co. $12,832—to Cosmos Constr. Co., 1.347 mi. Nelson Co. $14,722—to Noel Co., Jamestown, 13.476 mi. Mercer Co. $17,757—to J. Coglan, Lakota, 12.582 mi. Pembina Co. $32,972—to T. M. Swingin, Cooperstown, structural steel, same road $17,998—to North Dakota Metal Culvert Co., Fargo, corrugated metal culverts same road $1,641; in McLean Co. $237; Traill Co. $1,092—to Concrete Section Culvert Co., Fargo, in Pembina Co. $2,001; Traill Co. $2,635—to Rue Bros., Bismarck, 0.012 mi. structural work Pembina Co. $9,452; Traill Co. $7,965—to W. Coleman, Goodrich, grading 8.282 mi. McLean Co. $20,429—to North Dakota Concrete Products Co., Mandan, concrete pipe on same road $286—to Schultz Bros., Bowbells, grading 7.98 mi. Traill Co. $16,036—to Jardine Bros., Fargo, widening bridge Cass Co. $4,831—to Nolan Bros., 18 North 2nd St., Minneapolis, Minn., oil mix surfacing 6.366 mi. Richland Co. $31,418—to Standard Oil Co., 1300 Harmon Bldg., Minneapolis, Minn., furnishing oil for same road $9,031. Grand total $250,096.

O., Akron—F. E. Swineford, dir. P. Serv., setting back curb, widening roadway, sidewalks, paving, 3½ in. vitr. brick on 7 in. concrete paving 26,400 sq.yd., East Exchange St., to P. Maline, 52 Hoover St., $151,466. Noted May 7.

O., Cincinnati—Hamilton Co., concrete curbing, concrete guttering, grading, concrete paving 15,100 sq.yd. Brower Rd., to Brewer & Brewer Sons, 906 Main St., $37,840. Est. $63,177. Noted May 7.

O., Cincinnati — Hamilton Co., grading, tar bound macadam paving 10,687 ft. Bank Lick Rd. from I. C. H. 40 to I. C. H. 45, to D. C. Brunson, Mt. Healthy, $29,172 est. $48,946—13,500 ft. Grove Rd. from Winton Rd. to I. C. H. 43, to A. M. Slone, Drake Ave., $34,858 est. $63,969—9,844 ft. Dunlap Rd. from East Miami River Rd. to I. C. H. 40, to Van Camp Bros. Constr. Co., 2nd Natl. Bank, $27,638 est. $45,401 — grading, asphalt bound macadam paving 7,875 ft. Muddy Creek Pk. from Muddy Creek Rd. to Anderson Ferry Rd. and 10,125 ft. Humphrey Rd. from Loveland-Madeira Rd. to Hopewell Rd., to W. E. Pickelheimer, Newtonsville, $19,322 and $22,244 respectively, est. $37,097 and $46,346 respectively. Grand total $133,234.

O., Cincinnati—Hamilton Co., concrete curbing, guttering concrete paving 11,000 sq.yd. Yononte Rd. and concrete curbing, guttering, grading, concrete paving 51,400 sq.yd. Blue Ash Rd., to Brewer & Brewer Sons, 906 Main St., $35,707 and $128,699 respectively. Est. $56,926 and $207,299 respectively. Noted May 14.

O., Cleveland—Oil Asphalt paving East 19th St. from Prospect to Central Sts., to Bentley Bros. Co., Hanna Bldg., $11,913; sheet asphalt East 112th St. from St. Clair to Seller Aves., to Gould Constr. Co., 16311 Saranec Rd., $13,834.

O., Cleveland—Grading, stone curbing, brick paving 5,000 sq.yd. East 120th St., to Enterprise Paving & Constr. Co., 8444 Bway., $16,947; grading, stone curbing, asphalt surfacing 1,000 sq.yd. West 41st St., to Highway Constr. Co., Builders Exch. Bldg., $7,529.

O., Cleveland—Bd. Comrs. Cuyahoga Co., sandstone curbing, 4 in. drain tile guttering, 3 in. brick paving 25,750 sq.yd. Schaaf Rd. No. 3, to Highway Constr. Co., Builders Exch. Bldg., $123,960. Est. $188,948.

O., Cleveland Heights (br. Cleveland)—Sheet asphalt and asphaltic concrete paving repairs, to Cleveland Trinidad Paving Co., Western Reserve Bldg., Cleveland, $38,037 and $10,650.

O., Elyria—Lorain Co., grading concrete paving 16,946 sq.yd. Butternut Ridge Rd., to Ohio Engr. Co., 105-6 St. Lorain St., Cleveland, $26,340.

Okla., Nichols Hills (Oklahoma City P. O.)—T. A. Montague, city clk., to W. L. Hamitt, 2100 North Bway., Oklahoma City, grading, paving Dist. 12 $17,519 est. $25,000, Dist. 11, $16,993 est. $24,986, Dist. 10 $16,876 est. $26,000. Grand total $51,388. Noted May 14.

Pennsylvania—State Hy. Dpt., Harrisburg, grading, drainage structures, waterbound macadam surfacing 101,848 sq.yd. Route 49 Harrison Twp., Bedford Co., to McCrady Constr. Co., Pittsburgh, $197,810. Noted Apr. 23.

Pennsylvania—State Hy. Dpt., Harrisburg, grading, drainage structures, waterbound macadam surfacing 65,000 sq.yd. Route 588, Quincy and Guilford Twps., Franklin Co., to A. A. White Co., Lebanon, $178,482. Noted Apr. 16.

Pennsylvania—State Hy. Dpt., Harrisburg, grading, drainage structures, waterbound macadam surfacing 56,820 sq.yd. Route 714, Lower Windsor and Windsor Twps., York Co., to Keystone Paving Co., Harrisburg, $168,553. Noted Apr. 23.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, drainage structures, concrete surfacing 3,959 sq.yd. Perry Co., to J. H. Swanger, Lancaster, $18,930 — 19,570 sq.yd. Westmoreland Co., to J. C. Devine Co., Meadville, $58,903—24,000 sq.yd. Montgomery Co., to F. Feraco, 3632 Lawrence St., Phila., $49,081 — 38,150 sq.yd. Mercer Co., to Baldwin Bros., Union Trust Bldg., Cleveland, O., $114,252—grading, drainage structures, waterbound macadam surfacing 7,339 sq.yd. McKean Co., to Jersey Shore Constr. Co., Jersey Shore, $20,589—20,763 sq.yd. Bucks Co., to Dalton Bros., Inc., Paoli, $46,108. Grand total $307,863. Noted May 21.

Pa., Greensburg—G. A. McDowell, controller Westmoreland Co., rein.-con. resurfacing 7,948 ft. Latrobe-Youngstown Rd., near here, to A. Eidemiller, New Alexandria, $64,572. Noted May 21.

Pa., Johnstown—Curbing, guttering repressed vitr. brick on concrete surfacing 3,112 sq.yd. Valley Pike, to J. W. Shields, Vine St., $43,379; vitr. brick on concrete paving 535 sq.yd. Cooper Ave., to C. A. Ressler, 280 Fairfield Ave., $2,676.

Pa., New Brighton—M. Eppers, boro secy., interal concrete or sandstone curbing, 7 in. concrete paving sub-grading 10th and 11th Sts., to R. V. Baldwin, 1361 4th Ave., Coraopolis, $16,986. Est. 25,000.

Pa., Norristown—Montgomery Co., rein.-con. surfacing 28,800 ft. Swamp Pike, to Union Paving Co., Broad and Stiles Sts., Phila., $122,600.

Pa., Pittsburgh—E. G. Lang, dir. P. Wks., City-County Bldg., to M. O'Herron Co., South 1st and McKean Sts., sheet asphalt and brick on stone sub-base and concrete base paving Pennsylvania Ave. from Allegheny to Beaver Sts., $46,880 est. $53,000; sheet asphalt on concrete paving Frankstown Ave., $32,850 est. $42,000; reclipped blockstone on concrete repaving Allegheny Ave., $12,824 — to Domenick Paving Co., 331 Ladson Ave., Shady Ave. $15,434. Grand total $108,388.

Pa., Washington—Concrete paving Henderson Ave. from Sycamore St. to Oak Grove Bridge, to Irwin & Nealan, Hall and Shirls Sts., $44,621.

S. D., Redfield—Grading, curbing, concrete paving, to Booth & Olson, Insurance Exch. Bldg., Sioux City, Ia., $29,497.

Tex., Corpus Christi—Nueces Co., 2 in. shell on 7 in. concrete paving 3 mi. Driscoll-Patronilia Rd. and 4¼ mi. Up River and Orange Grove Rds., to Cage Bros., Bishop, $25,000 and $48,341 respectively; 1 in. asphalt on 7 in. rein.-con. paving 12 mi. Flour Bluff Rd., to Brown & Root, Corpus Christi, $130,421. Grand total $203,761.

Washington—S. J. Humes, dir. Hys., Olympia, crushed stone surfacing 33.8 mi. Yakima and Kittitas Counties, to H. G. Johnson, Perkins Hotel, Portland, Ore., $66,698—clearing, grubbing, grading, draining 3.307 mi. Stevens Co., to Siems Spokane Co., 412 Realty Bldg., Spokane, $52,856—0.208 mi. Grays Co., to Goetz & Brennan, 914 Seaboard Bldg., Seattle, $31,902 — 7.953 mi. Spokane Co., to C. A. Power, South 1703 Grand Blvd., Spokane, $183,481. Grand total $334,937. Noted May 7.

Wash., Port Townsend—Comrs. Jefferson Co., Court House, 2.9 mi. Lateral Hy. 3, Chimacum-Port Ludlow Rd., to J. H. Coyne, Port Townsend, $24,619. Est. $26,931.

Wash., Seattle—Paving 8th Ave. S., to S. A. Moceri, Inc., 475 Elliott Ave., (lead joint spec.) $49,293.

Wisconsin—State Hy. Comn. and Hy. Com. Grant, Iowa and Lafayette Counties, Lancaster, to F. C. Raemisch, Waunakee, grading 5.486 mi. Highland-Muscoda Rd. $10,985—to Brochman Bros., Sparta, 5.486 mi. Highland-Muscoda Rd. $14,977—to E. Kramer, Plain, crushed stone surfacing 6.23 mi. Dubuque-Platteville Rd. $11,921—to Overgaard & Weiss, Stoughton, 14.4 mi. Mineral Point-Belmont and Town Rds. $13,370; 3.25 mi. South Wayne-Gratiot Rd. $3,224; 9.25 mi. Warren-Gratiot

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Streets and Roads (Continued)

Rd. $14,876—to Watson & Jenkins, Rewey, 7.3 mi. Argyle-Blanchardville Rd. $2,700; mine tailing surfacing 9.1 mi. Hazzards Corners-Darlington Rd. and Stavers Corners-Belmont Rd. $9,371. Grand total $81,424.

Wisconsin—State Hy Comn. and Hy Comr., Monroe Co., Madison, grading, drainage 2.592 mi. and crushed stone surfacing 4.392 mi. Norwalk-Wilton Rd., to M. J. Barrickman, Maiden Rock, $39,898 and $10,758 respectively; grading 12.68 mi. Prentice-Ashland Rd., to A. Schroeder, Milwaukee, $148,170. Grand total $198,826. Noted May 21.

Wisconsin—State Hy. Comn., Milwaukee, grading Phillips-Fifield Rd., Option C Price Co., to A. Schroeder, Milwaukee, $148,169.

Wisconsin—State Hy. Comn, Milwaukee, improving U. S. Hy. 41, and S.G.M. Project 6, Dodge Co., to J. Rasmussen & Sons, Oshkosh, $12,000—Loganville Bridge relocation on S.T.H. 23, Sank Co., to L. S. Lunder Constr. Co., Madison, $4,205—Clarence Bridge, S.T.H. 20, Green Co., to Cunningham Bros., Beloit, $25,794. Grand total $41,999.

Wisconsin — State and Richland Co. Hy. Comns., Richland Center, crushed stone surfacing 5.15 mi. Richland Center-Boaz Rd., to Dieckmann Constr. Co., Kiel, $12,515—10.89 mi. Boaz-Readstown Rd., to E. Kraemer, Plain, $8,357—3.25 mi. roads in Akan, Richland Co., to G. McKinley Constr. Co., Wauzeka, $4,374. Grand total $25,246.

Wis., Milwaukee—Bd. P. Wks., to J. C. Bluhm & Son, 1299 Achilles Ave., improving alley between North 21st and 22nd Sts. $1,701; North 39th St. $5,618—to Gumz & Switalski, 2065 South 18th St., alley between North Sherman and North 48th Sts. $5,522; alley between North Green Bay and North Parkway $1,536; North 64th St. $4,152; West Stevenson St. $20,044—to Czerwinski Constr. Co., South 16th and West Morgan Sts., North 57th St. $11,560; North 72nd St. $10,170—to W. F. Hunt, 757 North Bway, West Center St. $25,255; East Wisconsin Ave. $1,727; North Downer Ave. $19,604; North 3rd St., $5,145; North 12th St. $32,037—to Messenger Constr. Co., 5111 West North Ave., West Fieborantz Ave. $1,097. Grand total $145,168.

Wis., Milwaukee—Milwaukee Co., warrenite paving Janesville Rd., to Badger Constr. Co., 229 East Wisconsin Ave., $52,420 — Janesville Rd. 2 and 3, to White Constr. Co., 110 East Wisconsin Ave., $54,842—amiesite paving Janesville Rd. 3, and Kentucky rock paving Janesville Rd. 4, to J. D. Bonness, 1627 North 48th St., $46,464 and $47,150 respectively—Hopkins Rd. 2, to McGucken & Vander Heyden, 188 4th St., $22,744. Grand total $223,620.

Wis., Racine—Racine Co. Hy Com., concrete paving 15,519 sq.yd. County Trunk E, State Project 2010, to Western Impvt. Co., Racine, $28,806.

British Columbia—P. Philip, engr., Dpt. P. Wks., Victoria, 2 in. bituminous surfacing or flush coats with non-skid surfaces on 34 mi. transprovincial and other hys., to Pacific Engineers Ltd., 1044 Beach Ave., $15,651, to Carter-Halls-Aldinger Co. Ltd., 510 Hastings St. W., $17,230; and to General Constr. Co. Ltd., Granville Island, $44,914, all foregoing of Vancouver. Grand total $77,795.

Ont., Toronto — Asphalt paving Powell and Whytock Aves., to Kilmer & Barber, Harbor Bldg., $3,517 and $3,030 respectively—part of Millwood Rd., to McNamara Constr. Co., 53 Yonge St., $7,436—asphalt paving and concrete curbing Dawlish Ave., to Law Constr. Co. Ltd., 225 Sterling Rd., $17,955—concrete paving 1 lane, to L. P. Acri, 28 Grove Ave., $4,961. Grand total $36,899.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Calif., Los Angeles—Bd. Comrs. Los Angeles Co. east levee and gunite protection on Big Tujunga Wash betwen Mullholland and Fenton Sts., near Pacoima, incl. Proposal 1, 38,000 cu.yd. fill, Proposal 2, 80,000 sq.ft. guniting levee slope, 50,000 sq.ft. manufacture and place pre-cast concrete toe mat; Proposal 3, 38,000 cu.yd. fill, 80,000 sq.ft. guniting levee slopes, 50,000 sq.ft. manufacturing and place pre-cast concrete toe mat. E. C. Eaton, Los Angeles, county ch. engr. flood control.

N. J., Belmar—Boro, Boro Hall, stone jetties at 16th Ave. $25,000. **Maturity probably soon.**

N. J., Long Branch—Bd. City Comrs., City Hall, 2 timber, stone, steel jetties north and south of Bath Ave. $25,000. O. R. Seaman, 210 Bway., engr.

BIDS ASKED

Ind., Fowler—June 18, by Bd. Comrs. Benton Co., Harrison Ditch, 40,180 ft. open ditch work, 1,550 ft. 12 and 20 in. tile, $25,600; Brumm Ditch, 16,616 ft. open ditch work, 18,605 ft. 6 and 30 in. tile, $27,710. D. Heaton, Fowler, engr.

Louisiana — June 16, by Bd. Comrs., 5th Louisiana Levee Dist., at office Bd. State Engineers, New Orleans Court Bldg., New Orleans, Glasscock Pit Drainage, 1,000 ft. long, 6,000 cu.yd. excav.; Grinnell Lake-Bayou Roundaway Drainage Canal, 223,000 cu.yd. excav.; at office Bd. State Engineers, New Orleans Court Bldg., New Orleans, Reid-Bedford Canal 2, 5,000 ft. long, 22,000 cu.yd. excav., 6 mi. below Delta Point.

Louisiana—June 16, by Bd. State Engineers, 207 New Orleans Court Bldg., New Orleans, drainage borrow pits on left bank Mississippi River, Pontchartrain Levee Dist., incl. 60,000 cu.yd. excav.; drainage borrow pits and restoring wave wash, right bank Mississippi River, Lafourche Basin Levee Dist., 60,000 cu.yd. excav.; on left bank Mississippi River, in Grand Prairie Levee Dist., Ostrica to Machello Levee, Plaquemine Parish, 70,000 cu.yd. excav.

La., New Orleans—June 16, by State Bd. Engineers, 29,000 ft. Grinnell Lake-Bayou Roundaway Drainage Canal, incl. 223,000 cu.yd. excav., for 5th Louisiana Levee Dist.

Mass., Chelsea—June 15, by City, F. C. Parow, chn. com., rein.-con. retaining wall, Quigley, Playstead and Essex Sts. Noted May 7.

Neb., Lincoln — June 13, by Comrs. Lancaster Co. Sanitary Dist. 1, W. C. Frampton, secy., 427 Bankers Life Bldg., deepening, widening Salt Creek, in northeast quarters, Sect. 7-10-7, incl. 330,849 cu.yd. excav. Scott & Scott, 427 Bankers Life Bldg., engrs.

N. Y., Buffalo—June 18, by W. Rathman, city engr., Municipal Bldg., dredging Buffalo Inner Harbor to completed contract depth for maintenance of channel from July 1 to June 30, 1932. Former bids rejected. Noted Apr. 23.

CONTRACTS AWARDED

Calif., Los Angeles—Los Angeles Co., levees along west bank Los Angeles River, incl. 110,000 cu.yd. earth fill, clear dump refuse, to T. G. Smith, 8517 Cypress Ave., South Gate, $16,590.

Indiana—Bd. Comrs. Henry and Rush Counties, constructing Golden Payne Drain, incl. 343,000 cu.yd. excav., to C. Haines & Sons, Greenville, O.

Indiana—Bd. Comrs. Rush and Henry Counties, dredging 16 mi. Golden Payne Ditch, to C. Haines & Sons, Greenville, O. Est. $25,000.

Ia., Sioux City—Woodbury Co., flood protection work 21st St. and Military Rd., to Harrington & Jorgensen, 3904 6th Ave., $20,261; paving South Alice St. from Euclid Ave. to Correctionville Rd. and paving parking area near city market, and West 8th and Bluff Sts., to Hansen & Wesley, 1616 West 5th St., $5,143 and $1,057 respectively. Grand total $26,461. Noted May 14.

Mass., Boston—See "Sports and Parks."

Mass., Somerville—First National Stores, Inc., 5 Middlesex Ave., excavating, grading Mystic Ave., for parking area and building purposes, to University Excavating Co., 38 Sacramento St., Cambridge. Est. $25,000.

Mass., Springfield—See "Power Plants."

N. Y., New York—A. Goldman, comr. Plant & Structures, Municipal Bldg., dike across Bronx Kills, to Premier Constr. Co., 153 West 72nd St., $17,650. Noted May 14.

Okla., Witcher — Oklahoma Co., improving Deep Fork D. D. 14, to Western Constr. Co., Hales Bldg., Oklahoma City, $39,066. Est. $50,000. Noted Dec. 4.

Bond Elections

Coming Bond Elections

Reservoir, Pumping Plant, etc. (Purchase private water system)—Belmont, Calif., $85,000. G. A. Kneese, Redwood City, Engr.

Waterworks Impvts.—Shawnee, Kan., June 19, $27,000. E. T. Archer & Co., Kansas City, Engrs.

Waterworks Impvts.—Longview, Tex., June 30, $30,000.

Sewage Treatment and Intercepting Sewers — Van Wert, O., November, $500,000. Jennings-Lawrence Co., Columbus, Engr.

Sewer Extensions—Longview, Tex., June 30, $40,000.

Bridge—Omaha, Neb., Douglas Co., $2,000,000.

Court House and Hall of Records — Stanislaus Co., Calif., $250,000.

Schools—Ft. Worth, Tex., June 24, $4,750,000.

Bonds Voted

Waterworks and Electric Light Plant — Natchitoches, La., $55,000.

Sanitary Sewerage System—Boise City, Okla., $55,000. C. A. Haskins, Kansas City, Mo., Engr.

Sewage Disposal System—Las Vegas, Nev., $160,000. W. L. Benham Co., Oklahoma City, Okla.

Schools—Worthington, Minn. $200,000. Jacobson & Jacobson, Minneapolis, Archts.

Power and Light Plant—Onaga, Kan., $45,000. L. B. Dunn, City Clk.

Bonds Defeated

Sewers and Disposal — Los Angeles, Calif., $6,000,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Conn., Bridgeport — POST OFFICE — Treas. Dpt. at office Sup. Archt., plans C. W. Walker, 1115 Main St., Bridgeport, U. S. Post Office, J. M. Howells, 154 East 46th St., New York, consult. archt.

Ky., Lexington—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., plans by Churchill & Gillig, Lexington, U. S. Post Office and Court House, B. B. Davis, Columbia Bldg., Louisville, consult. archt.

Ky., Louisville—HOSPITAL—Treas. Dpt. at office Sup. Archt., plans by D. X. Murphy & Bro., Louisville Trust Bldg., constructing hospital, remodeling present building for nurses' home and attendants quarters, at U. S. Marine Hospital. Noted Feb. 26.

N. J., Bloomfield—POST OFFICE—Treas. Dpt. at office Sup. Archt., sketches by W. O. Bartlett, 11 Raymond Bldg., Newark, 1 story, basement, brick, steel, rein.-con. post office, $150,000 or more.

N. C., High Point—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by J. M. Workman, Eccles Everhart and L. F. Voorhies, High Point, U. S. Post Office.

Pa., Allentown—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Jacoby & Everett, Allentown, U. S. Federal Building, F. R. Watson, Edkins & Thompson, Phila., consult. archts.

Pa., Williamsport — POST OFFICE — Treas. Dpt. at office Sup. Archt., plans by F. A. Rianhard, Williamsport, extending, remodeling U. S. Post Office and Court House.

Tex., Fort Worth — NARCOTIC FARMS — Treas. Dpt. at office Sup. Archt., narcotic farms, Tarrant Co., 6.5 mi. from here. A. W. Mellon, secy.

Tex., San Benito—POST OFFICE—Treas. Dpt. at office Sup. Archt., 1 or 2 story post office, $125,000-$150,000. I. D. Porter, Federal Bldg., Dallas, archt.

Utah, Ogden—SUPPLY DEPOT—Pub. Rds., 2 story, 100 x 150 ft. supply depot. $75,000. B. J. Finch, dist. engr.

Utah, Tooele — POST OFFICE — Treas. Dpt. at office Sup. Archt., sketches U. S. Post Office, $85,000.

BIDS ASKED

California—June 18, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading 6.752 mi. Sect. A, General Grant-Sequoia Park Approach Rd., Tulare Co.

Colorado—ROAD—June 16, by Pub. Rds., Denver, grading 10.606 mi. Routt Natl. Forest, Project 19-A-1 and C of Rabbit Ear Pass Natl. Forest Hy., Grand and Routt Counties. A. E. Palen, Denver, engr.

Fla., Jacksonville—SHORE DISCHARGE PIPE—June 18, by U. S. Eng., P. O. Box 45, riveted steel shore discharge pipe.

Fla., Key West—COURT HOUSE—June 26, by Treas. Dpt. at office Sup. Archt., U. S. Post Office, Court House, Custom House; adv. E. N.-R. June 11.

Fla., Miami—POST OFFICE, etc.—June 19 by Treas. Dpt. at office Sup. Archt., excavations and founds. for U. S. Post Office, Court House, and Custom House.

Idaho — FISH HATCHERY — J. R. Russell, supt. Bureau Fisheries, Seattle, Wash., taking bids fish hatchery in Hagerman Valley, on Snake River. $60,000.

Ia., Marengo — POST OFFICE — July 2, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E. N.-R. June 11.

La., New Orleans—EARTHWORK—June 25, by U. S. Eng., foot Prytania St., 11,000,000 cu.yd. earthwork in 2nd New Orleans Dist.

Me., Hallowell—POST OFFICE—June 26, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E. N.-R. June 11. Noted Dec. 11.

Md., Annapolis—HEATING PLANT, etc.—Spec. 6537—June 24, by Yards & Docks, Navy Dpt., altering heating plant and heating systems in buildings at Naval Academy (Radio Station); adv. E. N.-R. June 11.

Michigan—DREDGING—July 7, by U. S. Eng., Detroit, Round Island Shoal 1, St. Mary's River; adv. E. N.-R. June 11.

Mich., Bay City—ELEVATOR PLANT—June 24, by Treas. Dpt. at office Sup. Archt., elevator plant in U. S. Post Office, Court House and Custom House. Noted June 4.

Mich., Boyne City—POST OFFICE—June 25, by Treas. Dpt., at office Sup. Archt., constructing U. S. Post Office; adv. E. N.-R. June 11.

Mich., Owosso—POST OFFICE—July 25, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Miss., Biloxi — DREDGING — June 19, by U. S. Eng., Mobile, Ala., 1,070,000 cu.yd. in Mississippi Sound, Bay of Biloxi and Back Bay. Noted May 21.

Mo., Lamar — POST OFFICE — July 1, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E. N.-R. June 11.

Mo., Unionville—POST OFFICE—July 1, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Nev., Boulder City — ADMINISTRATION — June 17, by Bureau Reclamation Las Vegas, excavating for basements and founds., and grading, building sites for administration, hospital and dormitory buildings. W. Young, Las Vegas, resident engr.

New Jersey — DREDGING — June 22, by Treas. Dpt. at office Sup. Archt., 454,000 cu.yd. in Washington Canal and South River; adv. E. N.-R. June 11.

N. J., Lakehurst — BARRACKS, etc.— Spec. 6390—June 24, by Yards & Docks, Navy Dpt., barracks building and 8 officers quarters, Naval Air Station; adv. E. N.-R. June 11. Noted Feb. 26.

N. Y., Albany—POST OFFICE—June 10, by Treas. Dpt. at office Sup. Archt., clearing site for U. S. Post Office, Court and Custom House. Noted Jan. 2, 1930.

N. Y., Brooklyn—CABLE—June 15, by Signal Supply Officer, Army Base, 58th St. and 1st Ave., cable.

N. Y., Fort Wadsworth—QUARTERS—July 1, at office Con. Q. M., 2 double sets officers quarters; adv. E. N.-R. June 11.

O., Dayton—TORQUE STAND, etc.—June 25, by Con. Q. M., Wright Field, 80 x 280 ft. steel, concrete torque stand; radio beacon building;

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Federal Government Work (Continued)

dynamometer; storage building; ammunition magazine; oil house; maintenance building at Wright Field. $225,000.

R. I., Providence—ROCK REMOVAL—July 3, by U. S. Eng., 830 cu.yd. rock removal in Providence Harbor; adv. E. N.-R. June 11.

Tenn., Memphis—PILE DIKES—June 19, by U. S. Eng., 37,700 lin.ft. permeable pile dikes at various locations. Noted May 21.

Tex., Atlanta—POST OFFICE—July 1, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Tex., Palacios—WATER SUPPLY—June 15, at office United States Property & Disbursing Officer, Camp Mabry, Austin, water supply, Camp Hulen.

Tex., Randolph Field—PAVING—June 19, by Con. Q. M., rock asphalt or asphaltic concrete on concrete paving 130,000 sq.yd.

CONTRACTS AWARDED

Arizona—ROAD—C. H. Sweetser, dist. engr. Pub. Rds., 508 Ellis Bldg., Phoenix, grading, draining 13.663 mi. Pine Winslow Natl. Forest, Coconino Co., to Skousen Bros., Socorro, N. Mex., $71,023. Noted May 7.

California and Nevada—ROAD—C. H. Sweetser, dist. engr. Pub. Rds., San Francisco, Calif., oil processing 14.8 mi. Mono-Topaz Lake Natl. Forest Hy., Mono Natl. Forest, Douglas Co. Nev. and Mono Co., Calif., to Tiffany-McReynolds & Tiffany, San Jose, Calif., $34,107. Est. $37,371. Noted May 14.

Calif., San Francisco—HOSPITAL—Con. Q. M., Fort Mason, general contract 3 story, rein.-con. ward additions to F. J. Reilly, 6350 Fulton St., $81,886; plumbing, to Skelly & Kohler, 1344 9th Ave., $21,072; electrical work, to G. H. Armstrong, 2890 Howard St., San Francisco, $6,298; heating in Ward G-1, to G. Rehn, 1919 Mission St. $2,676, in Ward F-1, to A. Ramazzoti, 1473 Valley St. Noted Apr. 9.

Colorado — ROAD — Dpt. Agriculture, Pub. Rds., Custom House, Denver, grading, draining Loveland-Fremont Natl. Forest Rd., Lake Co., to Cole Bros., Pueblo, Colo., $47,553. Noted May 7.

La., Harvey—TRESTLE—U. S. Eng., New Orleans, Harvey Lock found., piling, cofferdam, lock walls, to C. F. Lytle, 504 Nebraska St., Sioux City, Ia., $686,216. Noted Mar. 12.

La., Shreveport—SEWERAGE SYSTEM—Con. Q.M. sanitary sewerage system, to Fogy, Hanson & McCorkle, Lake Charles, $37,900. Noted Apr. 16.

Minn., Noyes — INSPECTION STATION — U. S. Eng., inspection station, to F. A. Carlson & Co., 617 Lyceum Bldg., Duluth, $59,750. Noted Apr. 30.

Mo., Kansas City — ELEVATORS, etc. — Treas. Dpt. at office Sup. Archt., elevators in U. S. Post Office, to Haughton Elevator Co., Vermont Bldg., Wash., D. C., $138,867; mail handling equipment, to Alvey Ferguson Co., Oakley, Cincinnati, O., $276,983. Noted June 4.

Montana—ROAD—Pub. Rds., Portland, Ore., grading, paving 4.478 mi. Transmountain Hy., Glacier Co. 16 and 18 ft., to A. Guthrie & Co., Sherlock Bldg., Portland, Ore., $200,178.

Nevada—ROAD—C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, Calif., oil processing 3.085 mi. Glenbrook Natl. Forest Hy., Douglas Co., to Tiffany-McReynolds & Tiffany, San Jose, Calif., $9,434. Est. $10,880. Noted May 14.

N. J., Fort Monmouth—APARTMENT—Con. Q. M., 4 family apartment, 8 company officers quarters, 7 non-commissioned officers quarters, to Natl. Constr. Co., Tower Bldg., Wash., D. C., $309,999. Noted Apr. 23.

O., Fremont—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to Rosen & Fischell, 11 South LaSalle St., Chicago, Ill., $132,425. Noted May 7.

Pa., Rochester—POST OFFICE—Treas. Dpt. at office Sup. Archt., 1 story, basement, 84 x 84 ft., brick, stone, limestone, Jackson and Connecticut Sts., to R. B. McDanel, 4th Ave. and 7th St., New Brighton, $82,999. Noted Apr. 30.

Pa., Warren—POST OFFICE—Treas. Dpt. at office Sup. Archt., general contract 2 story, basement, 99 x 136 ft., brick, stone, to Rosen & Fischel, Inc., 11 South LaSalle St., Chicago, Ill., $142,970. Noted Apr. 30.

Tenn., Memphis—BRUSH and POLES—U. S. Eng., McCall Bldg., 40,000 cords brush and poles, to Woods Bros. Constr. Co., 132 South 13th St., Lincoln, Neb., at $2.25 per cord. Noted May 7.

Va., Lynchburg—POST OFFICE—Treas. Dpt. at office Sup. Archt., remodeling U. S. Post Office, to E. E. Garber & Co., Bethlehem, Pa., $6,900. Noted May 21.

Utah—ROAD—Pub. Rds., Ogden, grading, surfacing 10.398 mi. Bryce Canyon Natl. Park Hy., Garfield Co., to Union Constr. Co. Ogden, $135,852. Est. $135,424. Noted May 28.

Washington—ROAD—Pub. Rds., Portland, Ore., grading, paving Mount Baker Hy., Watcom Co., 16 and 18 ft., to L. Romano Co., Thompson Bldg., Seattle, $66,722. Noted May 22 Daily.

Wyoming—ROAD—Pub. Rds., Custom House, Denver, grading, draining 10.868 mi. Buffalo-Tensleep Natl. Forest Rd., Jackson Co., to Peterson, Shirley & Gunther, 1411 W.O.W. Bldg., Omaha, Neb., $114,714. Noted May 26 Daily.

RAILWAYS

PROPOSED WORK

Texas—Fort Worth & Denver Ry., subsidiary Colorado & Southern Ry., R. G. Gowdy, ch. engr., Denver, Colo., granted permit constructing

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extension from Shamrock to point near Wellington. $600,000. Private plans.

CONTRACTS AWARDED

Calif., Los Angeles—Los Angeles Co., laying 9,500 lin.ft. track, constructing 60,000 tons riprap along west side Los Angeles River from Artesia to Orange Sts., to Hauser Constr. Co., Security Bldg., Long Beach, $76,700.

SUBWAYS AND TUNNELS

CONTRACTS AWARDED

Calif., Sacramento—See "Grade Crossings."

Tex., Houston—Sinclair-Texas Pipe Line Co., Esperson Bldg., 600 ft. 8 x 8 ft. concrete lined tunnel under Houston Ship Canal, to Subway Eng. Co., 115 South Dearborn St., Chicago, Ill. Est. $125,000.

Que., Lachine—City, enlarging tunnel under Canadian Pacific Ry., Rochfield St., to Kendall Bros. Ltd., 1605 Iberville St., Montreal, $40,429; steel structure of tunnel, to Dominion Bridge Co. Ltd., 1111 Beaver Hall, Montreal, $24,000.

GRADE CROSSINGS

PROPOSED WORK

Oklahoma—State Hy. Dpt., Oklahoma City, preliminary plans 1 span 146 ft. rein.-con. underpass under Chicago, Rock Island & Pacific R.R. at Canute, Washita Co., $25,000; 150 ft. rein.-con. underpass under same railroad at Weatherford, Custer Co., $26,036. A. R. Losh, hy. engr.

Ont., Chatham—Kent Co., steel, concrete subway under Michigan Central Ry. on Raleigh-Harwich Twp. line, near Charing Cross, $30,000. W. D. Colby, Harrison Hall, engr.

BIDS ASKED

Pa., Phila.—June 22, at office C. Dillenbeck, ch. engr. Reading Ry. Co., 505 Reading Terminal Bldg., construction work between 1,000 ft. south of Wister and Haines Sts., appurtenant to abolishment of grade crossings along Germantown and Chestnut Hill Branch of company. Contrs. 7, 9, 10 and 11; adv. E. N.-R. June 11.

Tex., Waco—See "Streets and Roads, under Texas."

CONTRACTS AWARDED

Calif., Sacramento—City and Southern Pacific R.R. Co., 65 Market St., San Francisco, G. W. Boshke, ch. engr., H. Street Subway, to Lindgren-Swinerton, Inc., California State Life Bldg., Sacramento, and Standard Oil Bldg., San Francisco, $59,000. Noted Dec. 11.

N. Y., Canton—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating cemetery crossing of railroad located 2 miles northeast of here, to Bates & Rogers Constr. Co., Inc., 75 West St., New York, $62,919.

DAMS

PROPOSED WORK

Calif., Los Angeles—Bd. Comrs. Los Angeles Co., soon takes bids diamond core drilling west abutment Big Santa Anita Dam, incl. (1) 50 lin.ft. holes 150 ft. deep or less in depth, in any material, casing left in place and incl. cost of casing (2) 950 lin.ft. holes 150 ft. or less in any material, casing, if used, removed from holes; east abutments San Dimas Dam, (1) 50 lin.ft. holes 175 ft. or less in depth, in any material, casing left in place, incl. cost of casing (2) 1,450 lin.ft. holes, 175 ft. or less in depth, in material, casing, if used, removed from holes.

BIDS ASKED

N. H., Keene—See "Waterworks."

PIERS AND WHARVES

PROPOSED WORK

Tex., Port Isabel — San Benito-Port Isabel Navigation Dist., c/o E. Downs, San Benito, soon takes bids terminal facilities, incl. wharves, docks, warehouse. $150,000. W. E. Brown, Port Isabel, dist. engr.

CONTRACTS AWARDED

Calif., Long Beach—WHARF—Neptune Pier Co., (1st unit) 1,464 x 14 ft. trestle and 274 x 30 ft. creosoted pile wharf for 3 boat landings, to Merritt Chapman & Scott, San Pedro, $50,000. Total est. pleasure pier project $1,000,000. Noted June 4.

AIRPORTS

BIDS ASKED

N. J., Newark—June 16, by State Military Bd., Trenton, hangar at Newark Airport. $800,000.

CONTRACTS AWARDED

Mo., Kansas City—National Air Transport, Inc., N.K.C. Bldg., Kansas City, and 420 Lexington Ave., New York, municipal hangar, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $150,000. Noted Apr. 9.

GRAIN ELEVATORS

PROPOSED WORK

Ark., Stuttgart—GRAIN ELEVATOR—See "Factories and Mills."

POWER AND LIGHTING

PROPOSED WORK

Minn., Montevideo — Skelly Oil Co., 1206 Plymouth Bldg., Minneapolis, distribution mains, installing gas plant, storage tank. $75,000. Private plans.

BIDS ASKED

Ill., East St. Louis—See "Streets and Roads."

New York—June 26, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, furnishing, installing direct current connections and track bonding for part Independent System City-Owned Rapid Transit Railroads in Manhattan, Brooklyn and Queens Boros.

New York—June 29, by Westchester County Park Comn., J. Downer, ch. engr., Bronxville, electric lighting on 12.54 mi. Bronx Parkway extension from Valhalla to Croton Lake, Westchester Co.; adv. E.N.-R. June 11.

CONTRACTS AWARDED

Mass., Reading—Town, A. Sias, Light Dpt., post and cable work for underground system, to James Suden Co., 126 Worcester St., Boston; underground work, incl. conduits, manholes, to R. C. Allen Constr. Co., 507 Main St., Worcester. Est. $35,000.

PARKS AND SPORTS

PROPOSED WORK

N. J., Long Branch—Hollywood Beach Club, 1133 Bway., New York, bids in July, concrete, tile swimming pool, Ocean Ave. $25,000. H. B. Seymour, 614 McClellan St., engr.

N. J., Maplewood — Maplewood Club, 11 Claremont Ave., concrete, tile swimming pool. $25,000. **Maturity probably soon.**

O., Toledo — City, steel stadium. $35,000. Engineer not selected.

BIDS ASKED

Mass., Boston—June 12, by Park Dpt., 33 Beacon St., 1 story, brick, stone antelope house, Franklin Park, Dorchester, $68,720 appropriated, J. G. McGann, 129 Newbury St., engr. Noted May 14.

Pa., Sharon—June 12, by St. Joseph Parish, A. Hoeing, in charge, 786 East State St., 1 story, basement, 67 x 113 ft., brick, tile gymnasium and community building, incl. bleachers, swimming pool, lockers, concrete footings, terra cotta flue lining, steel stairs, steel sash, 760 East State St. Clepper & Clepper, McDowell Natl. Bank Bldg., archts.

CONTRACTS AWARDED

Conn., East Hartford (br. Hartford)—C. H. Wickham, Burnside Ave., 35 x 165 ft., concrete swimming pool, concrete tennis court, to Aceto-Smith Co., East Center St., South Manchester. Est. $25,000.

Mass., Boston—City, Park Dpt., 33 Beacon St., excavating, grading Fallon Field, Roslindale, to Dooley Bros., 73 Howard St., Roxbury, $15,072. Noted Dec. 25.

N. Y., Brooklyn—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., constructing exit road in Prospect Park, to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., $16,656; bituminous macadam paving Highland Blvd., to D. J. McCoy Asphalt Paving Co., Avenue U and East 57th St., $10,396; improving New Lots Playground, to A. Ross, 293 Troy Ave., $5,270; improving Children's Museum, Brower Park, to J. D. Norton, 20 Sterling Pl., $1,900. Grand total $34,222. Noted May 21.

Okla., Tulsa—Clerk Tulsa Co., 1 story, 208 x 308 ft., rein.-con., brick live stock coliseum, plain found., Fair Grounds, to Manhattan Constr. Co., Philcade Bldg., Tulsa, $268,600. Noted May 21.

Pa., Mt. Oliver—J. A. Wagner, boro burgess, 40 x 80 ft. concrete swimming pool and filter system, 14 x 28 ft. concrete wading pool, to M. Brusco & Co., 2135 Pioneer Ave., Pittsburgh, $5,923; 1 story, 24 x 52 ft., brick, tile bath house and cement walks, to J. Ferrone, Blaw Knox, $6,130; fence, to Stewart Holland Co., 2020 West Liberty Ave., Pittsburgh, $1,131; plumbing, to T. H. Edwards, 233 Amanda St., Pittsburgh, $5,699; concrete retaining wall, to James & Rocco Very, 701 Hays St., Pittsburgh, $2,950. Grand total $21,833.

HEATING AND VENTILATING

PROPOSED WORK

Ia., Vinton — State School for Blind, c/o State Bd. Educ., W. H. Gemmill, secy., State Capitol Bldg., Des Moines, preliminary plans concrete, brick heating plant. $50,000. E. E. Cole, Dpt. Constr., Cedar Falls, archt.

BIDS ASKED

Ia., Cedar Falls—See "Power Plants."

N. J., North Bergen—June 18, by Bd. Educ., Municipal Bldg., furnishing, installing heating work in Schools 5, 6, 7 and 8. $25,000. R. Glenn, North Bergen, twp. engr.

N. J., Rahway—June 18, by Dpt. Institutions & Agencies, State House, Trenton, heating units and plumbing supplies at Main Building, Rahway Reformatory. $25,000. Div. Architecture & Constr., Trenton, archt.

Heating and Ventilating (Continued)

N. Y., Brooklyn—June 15, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., heating, ventilating, plumbing, drainage, lighting fixtures, for P. S. 101 addition, Benson Ave. from 24th Ave. to Bay 35th St., for Bd. Educ., 500 Park Ave., New York.

N. Y., New York—June 15, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, heating, ventilating, plumbing, drainage, electrical work, lighting fixtures, for Bronx Continuation School, East 151st and 152nd Sts., west of Courtlandt Ave., for Bd. Educ., 500 Park Ave.

N. Y., New York—June 19, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., furnishing, installing electrically heated hot water heater in Line Service Building, 207th St. Shops, 215th St. and 9th Ave.

UNCLASSIFIED

PROPOSED WORK

Mo., St. Louis—FIRE ALARM SYSTEMS—Bd. P. Serv., City Hall, rejected bids Apr. 14, automatic fire alarm systems in various city institutions. $150,000. Will readvertise. Noted Mar. 19.

N. Y., New York — MECHANICAL EQUIPMENT—Dpt. Hospitals, Municipal Bldg., bids in August, mechanical equipment for Neurological Unit, Metropolitan Hospital, Welfare Island. Noted Jan. 8, under "Hospitals."

Utah, Salt Lake City — TOURIST CAMP — F. DeNightie & M. J. Geuitse, c/o H. C. Lewis, archt., Salt Lake City, preliminary plans tourist camp, 23 x 400 ft. main lodge. $40,000.

N. S., Halifax — GAS TANK — Nova Scotia Light & Power Co., gas tank, 600,000 cu.ft. capacity.

Que., Gatineau Pointe—MOVIE STUDIO—St. Lawrence Motion Pictures Corp., J. Desrochers, mgr., Ville St. Michael, movie studio. $300,000.

BIDS ASKED

Colo., Pueblo — BLAST FURNACE — See "Contracts Awarded."

Ind., Evansville—FIRE ALARM SYSTEM—City Council, A. Grisese, mayor, bids about June 15, control fire alarm system, incl. radio broad casting, battery rooms, apparatus and boiler rooms, steel, stone, glazed brick, 7th St. near Walnut St. $30,000.

N. J., Skillman—ELEVATORS—June 15, by Dpt. Institutions & Agencies, State Office Bldg., elevators at hospital building, State Village for Epileptics, $5,000, Div. Architecture & Constr., State Office Bldg., Trenton, engrs.

N. Y., New York—BORINGS—June 17, by S. Levy, pres. Manhattan Boro. Municipal Bldg., borings on Sect. 1, Div. 2, 12th Ave. and Marginal St. from West 38th to West 48th Sts., and from West 57th to West 59th Sts. in connection with elevated hy. with ramp approaches along waterfront of Hudson River from Canal to 72nd Sts., Contr. 2.

N. Y., New York—FIRE EXTINGUISHING EQUIPMENT—June 16, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., fire extinguishing system, for City-owned Rapid Transit R.R. extending from Fulton St. to 207th St. and in 207th St. Yards and Shops, Contr. S-13. Former bids rejected. Noted Apr. 2.

O., Cleveland—STEPS—June 18, by City, repairing stone steps at City Hall. $25,000. H. Kregelius, City Hall, engr.

Pa., Phila.—SUMP PUMPS, etc.—June 23, by Dpt. City Transit, City Hall Annex, C. E. Myers, dir., Contr. 314, Broad Street Subway, West Philadelphia Branch, incl. 2 sump pumps for Callowhill St. Station, 3 sump pumps for Filbert St. Station, incl. equipment; Contr. 315, plumbing, sewage ejectors for Ridge Avenue and 8th St., plumbing, ejector equipment for 4 stations West Philadelphia Branch Broad Street Subway and in signal tower Fairmount Station of North Broad Street Subway.

CONTRACTS AWARDED

Colo., Pueblo—BLAST FURNACE—Colorado Fuel & Iron Co., c/o L. F. Quigg, supt., razing furnace preparatory to repairing, relining stoves of furnace, day labor. $250,000. W. H. Bailey, Pueblo, engr.

N. Y., Brooklyn—COMFORT STATION—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, general contract comfort station, Ocean Ave. entrance, Prospect Park, to George Ramm, Inc., 101 Liberty Ave., Brooklyn, $19,200; plumbing and heating, to J. S. Murphy Co., Inc., 1 East 42nd St., New York, $4,589. Noted May 21.

O., Cleveland—CULVERTS—Bd. Comrs. Cuyahoga Co., concrete culverts on Chagrin River, 1,350 cu.yd. earth excav., 1,024 cu.yd. rein.-con., 136,870 lb. reinforcing steel, 490 sq.yd. waterproofing, to Green Mills Constr. Co., Bedford, $18,017. Est. $28,838. Noted May 21.

Tennessee — GAS PIPE LINE — Memphis Natural Gas Co., 42 Cedar St., New York, H. G. Scott, pres., 12 in. high pressure natural gas line from Memphis to Jackson, serving towns in west Tennessee, franchises granted to Covington, Ripley, Brownsville and Jackson, to Ford, Bacon & Davis, 39 Bway., New York. Est. $2,500,000. Noted Jan. 29.

W. Va., Newell — TUNNEL KILN — See "Factories and Mills."

MATERIALS

BIDS ASKED

SCREENINGS, OIL, etc.—**Alameda, Calif.**—City Council taking bids 1,000 tons screenings, 500 tons crushed stone, 6 tons Birds-eye screenings, 2,000 bbl. (Calol) road oil, 2,000 tons bitumuls 95%.

VITRIFIED FIRE CLAY PAVING BLOCKS—**Atlantic City, N. J.**—June 11, by Bd. City Comrs., City Hall, 50,000 vitr. fire clay paving blocks not less than 3 x 4 x 8.5 in., f.o.b. cars Pennsylvania R.R. $5,000. J. W. Hackney, city comr.

CEMENT—**Trenton, N. J.**—June 22, by Dpt. Institutions & Agencies, 14,700 bbl. cement; 38,997 sq.yd. reinforcement complete with tie bars, corner bars, dowel pins, dowel pin chairs, etc., for Type C pavement; 28,600 lin.ft. expansion joint ½ x 8 in. joint in 10 ft. lengths, with sufficient bituminous filler to seal joints; 5,000 tons each 1½ and ¾ in. washed pebbles; 5,000 tons sand; 348 lin.ft. 18 in., 84 lin.ft. 24 in. and 168 lin.ft. 36 in. c.i. pipe; 38,997 sq.yd. concrete.

ASPHALT EMULSION—**New York, N. Y.**—June 15, by P. J. Dooling, comr. Purchase, Municipal Bldg., furnishing, delivering, applying asphalt emulsion for Dpt. Water Supply, Gas & Electricity.

ASPHALTIC CEMENT—**St. George, N. Y.**—June 17, by J. A. Lynch, pres. Richmond Boro. Boro Hall, 35,000 gal. asphaltic cement at asphalt plant, Richmond Terrace near Taylor St.

CONTRACTS AWARDED

PIPE—**Paterson, N. J.**—Passaic Valley Water Comn., 156 Ellison St., 705 ft. 24 in. steel pipe, to New Jersey Eng. & Supply Co., Main Ave., Passaic, $5,775; c.i. pipe, to R. D. Wood Co., 400 Chestnut St., Phila., Pa., at $32.70 per ton.

INLET ELBOWS, etc.—**Milwaukee, Wis.**—Central Bd. Purchase, c.i. inlet elbows, bowls, inlet boxes, c.i. heads, manhole lids, grates, to Municipal Foundries, Inc., West Allis, $24,265; 925 series street lighting transformer coils, to Trester Serv. Electric Co., 55 East Wells St., Milwaukee, $5,196. Noted May 1 Daily.

EQUIPMENT

PROPOSED WORK

STEAM CONDENSER — **Pasadena, Calif.** — City Council will take new bids on new specifications steam condenser for municipal light plant. Former bids rejected.

ENGINE—**Holly Springs, Miss.**—City Council purchasing 280 hp. oil burning engine.

BIDS ASKED

FEED REGULATORS — **Burbank, Calif.** — June 16, by W. S. Patterson, city mgr., 9 induction type, single phase, feeder regulators.

STEAM CONDENSER — **Pasadena, Calif.** — June 26, by City Directors, B. Chamberlain, city clk., furnishing, installing 2-pass steel plate surface condenser with 2 unequal circulating pumps, appurtenances. Former bids rejected.

TUNNEL EQUIPMENT—**San Francisco, Calif.**—Wallace Young, 342 Arnoux Hotel, in market tunnel equipment usable in 10 ft. diam. 20,000 ft. tunnel.

MOTORS—**New Orleans, La.**—July 15, by Sewerage & Water Bd., 526 Carondolet St., two 450 hp. and two 250 hp. vertical synchronous motors.

POST HYDRANTS—**Boston, Mass.**—June 12, Dpt. P. Wks., J. A. Rourke, comr., 50 post hydrants for Water Div. $5,000.

CONCRETE MIXER—**Trenton, N. J.**—June 12, by State Purchasing Agent, concrete mixer, pig iron, planking, embossing dies for road markers. $5,000.

CONTRACTS AWARDED

GENERATOR UNIT—**Fredonia, Kan.**—City Clerk, 600 kw. oil engine generator unit, to Nordborg Engine Co., Milwaukee, Wis., $42,000.

FOREIGN

Egypt, Cairo—July 11, by Dpt. Interior, supply and erection diesel driven alternators, switchgear, transformers, pumping sets, also 40 ton crane for electric power station at Mansourel.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

Calif., Los Angeles — Swartz & Jester, 429 Insurance Exch. Bldg., taking sub-bids 7 story, basement, 50 x 133 ft., concrete, brick, steel apartment, garage, for Independent Holding Corp. $200,000. M. Maltzman, 220 Rives-Strong Bldg., archt.

Calif., San Francisco—H. C. Baumann, archt., 251 Kearny St., taking bids 7 story, basement, rein.-con., steel hotel, store, Market and Laguna Sts., for Allen & Co., 168 Sutter St. $175,000. J. M. Smith, 251 Kearny St., engr.

N. Y., Jamaica—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

Ind., Michigan City — Conservation Dpt. Dunes State Park, Porter Co., general contract brick, steel hotel, to Stefco Steel Co., Roeske Ave., concrete contract, to Tonn & Blank, Michigan City. Est. $150,000. Noted Feb. 5.

Ky., Louisville—Roseland Holding Corp., c/o Joseph & Joseph, archts., and Walter G. Wagner, assoc. archt., Breslin Bldg., 14 story, basement, 125 x 190 ft., face brick, terra cotta, incl. 100 car capacity storage garage, to D. C. Kay, 18 Stratheaarn Bldg., Toronto, Ont., Canada. Est. $1,000,000. Noted June 4.

N. Y., Jamaica—Alden Terrace Homes, 89-17 161st St., apartment, 64th Rd. and Harcourt Pl., separate contracts. $150,000. C. Infanger, c/o owner, archt.

N. Y., New York—A. C. W. Corp., A. E. Kazen, 80 Van Courtland Parkway, apartment Van Courtland Park S. and Gale Pl., separate contracts. $500,000. Springsteen & Goldhammer, 40 East 49th St., archts.

N. Y., New York—Olmwest Realty Corp., N. Botwin, pres., 337 East 140th St., 4 story, 196th St. and St. Paul's Ave., separate contracts. $150,000. I. L. Cransman, 332 East 149th St., archt.

N. Y., New York—J. Bruno, 737 Astor Ave., 4 story, Wallace and Adee Aves., separate contracts. $150,000. Franklin, Bates & Heindsmann, 2526 Webster Ave., archts.

N. Y., New York—H. Solomon, 4756 3rd Ave., 6 story, Jerome Ave. and Minerva Pl., separate contracts. $160,000. R. Gottlieb, 4756 3rd Ave., archt.

N. Y., New York—Corporation, c/o A. Pross, 41 East 42nd St., apartment, Fish and Givan Aves., to Feature Homes, Inc., 41 East 42nd St. Est. $220,000.

N. Y., New York—Corporation, c/o A. Magistro, 512 East 187th St., 6 story, 66 x 91 ft. apartment, Barker Ave. and Thwartes Pl., separate contracts. $150,000. G. W. Swiller, 4215 73rd Ave., archt.

N. Y., New York—Corporation, c/o H. Tuchman, 302 Bway, 6 story, 75 x 90 ft. apartment, 151st St. and Melrose Ave., separate contracts. $150,000. M. W. Del Gaudio, 545 5th Ave., archt.

N. Y., New York—H. Greston, 165 Bway., 6 story, 50 x 100 ft., Webb and Reservoir Aves., separate contracts. $150,000. G. W. Swiller, 4215 3rd Ave., archt.

N. Y., New York — G. Halpern, 414 East 204th St., 6 story, Nelson Ave. and 166th St., separate contracts. $180,000. Franklin, Bates & Heindsmann, 2526 Webster Ave., archts.

N. Y., New York — Harmon Realty Co., M. Brown, pres., 285 Madison Ave., apartment, Tibbett Ave. and 234th St., separate contracts. $150,000. I. Brooks, 16 Court St., Brooklyn, archt.

N. Y., New York—J. Janos, 349 East 149th St., 6 story, 84 x 175 ft., Bolton St. and Pelham Parkway, separate contracts. $200,000. J. Lubroth, 44 Court St., Brooklyn, archt.

N. Y., New York—C. Kane, 1440 Bway., 6 story, basement, 167th St. and Morris Ave., separate contracts. $275,000. Goldner & Goldner, 19 West 44th St., archts.

N. Y., New York—Pelbolt Building Corp., 349 East 149th St., 6 story, basement, brick, Bolton and Lydig Sts., separate contracts. $200,000. J. Lubroth, 44 Court St., Brooklyn, archt.

N. Y., New York—Vigo Realty Co., 1962 Arthur Ave., apartment, Newbold and Castle Hill Aves., separate contracts. $150,000. G. W. Swiller, 4215 3rd Ave., archt.

Okla., Oklahoma City—W. B. Skirvin, 1st St. and Bway., structural steel for new Skirvin Hotel Tower, 19 story, basement, 100 x 140 ft., brick, steel, caisson found., 1st St., to Captol Steel & Iron Wks., 815 South Bway., $300,000. Noted Dec. 18.

T. H., Waikiki — Clifford Kimball, 2 story, concrete hotel, administration building, to G. J. Oda Contg. Co., Ltd., Honolulu, $175,000.

CLUBS

PROPOSED WORK

Ill., Chicago—Chicago Boys Club, 120 South La Salle St., plans by Graham, Anderson, Probst & White, 80 East Jackson Blvd., 2 story, brick, on 103 x 124 ft. site, Emerald Ave. and 34th St. $150,000.

Ia., Mason City—Masonic Temple c/o W. A. Westfell, chn. building com., sketches concrete, brick, stone club, 2nd St. and Pennsylvania Ave. $150,000.

N. J., Garfield — Farnham Democratic Club, 103 Farnham Ave., will not build 2 story, basement, brick, steel clubhouse, Farnham Rd. Project abandoned. $150,000. Noted May 7.

N. J., Jersey City—J. F. Jackson, archt., 137 East 45th St., New York, general contract 7 story, basement, 100 x 100 ft. brick, steel, rein.-con. addition, Fairview Ave., for Y.M.C.A., S. H. Lipscomb, genl. secy., 654 Bergen Ave. $300,000. Project indefinitely in abeyance. Noted May 28.

N. Y., New York—Amer. University Club, 40 story club. $8,000,000. **Maturity late in 1932.** Bottomley, Wagner & White, 60 East 42nd St., New York, archts. Noted Jan. 8.

N. Y., New York — New York Fraternity Clubs, 22 East 38th St., club. $2,000,000. **Maturity about February.** Noted Jan. 15.

O., Cleveland—Y.M.C.A., 347 Madison Ave., New York, and 2200 Prospect St., plans by National Bureau Y.M.C.A., 347 Madison Ave., New York., and takes bids about November, general contract Y.M.C.A. $400,000.

BIDS ASKED

N. J., Newark—F. H. Koenigsberger, archt., 48 Walnut St., Newark, bids about July 1, general contract 2 story, basement, brick, steel club, market, Washington and Linden Sts., for Steuben Holding Corp., 60 Park Pl. Est. $150,000. Noted June 4.

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Clubs (Continued)

Pa., Pittsburgh — June 15, by Geisler & Smithyman, 335 Boulevard of Allies, Islam Grotto Temple, 6 story, basement, 90'x 140 ft. and 40 x 66 ft., brick, steel, terra cotta, ornamental iron, Moorish type architecture, Montgomery Ave., for Islam Grotto, W. Weberg, monarch, North Ave. N. S. $160,000.

HOSPITALS

PROPOSED WORK

Calif., Agnews—State of California, Sacramento, ward and employees buildings, State Hospital. $455,000 available.

Calif., Norwalk — State of California farm patients building at State Hospital. $160,000 funds available.

Calif., Stockton—State of California, Sacramento, sketches additional units state hospital. $195,000 funds available.

Calif., Talmadge — State of California (at State Hospital Grounds), sketches reconstructing ward buildings. $160,000 funds available.

Conn., Putnam—Day Kimball Memorial Hospital, 175 Pomfret St., sketches by A. C. Daniels, Shrewsbury, Mass., 3 story, 40 x 146 ft., hospital addition. $300,000.

Idaho, Lava Hot Springs—Godfrey & Allen, Inc., c/o H. P. Allen, Lava Hot Springs, sanitarium, hotel, incl. plunge. $250,000. Architect not selected.

Ill., Chicago—Cook Co. Comn., County Bldg., soon takes bids 17 story, basement, 162 x 202 ft., rein.-con., steel, face brick nurses' home, Lincoln and Polk Sts. $2,350,000. E. E. Hall, 123 West Madison St., archts. Noted Mar. 12.

Mass., Adams—Plunkett Memorial Hospital soon lets contract 2½ story, 40 x 75 ft., and 35 x 80 ft., brick, steel, granite maternity and nurses' home units. $150,000. Parker, Thomas & Rice, 177 State St., Boston, archts.

Mass., Fall River — Union Hospital, J. Smithies, supt., 538 Prospect St., plans by E. I. Marvell, 209 Bedford St., brick, steel nurses' home, Prospect St. $150,000.

Mass., Webster—Webster District Hospital, S. L. Whipple, pres., 824 School St., brick, steel addition, Thompson St. $150,000 or more. Architect not selected.

N. J., Preakness—Bd. Freeholders Passaic Co., Court House, Paterson, bids in July, 2 story, basement, brick, steel preventorium (children's unit), Valley View. $500,000. F. W. Wentworth, 140 Market St., Paterson, archt. Noted June 4.

N. J., Scotch Plains—Bd. Freeholders Essex Co., Court House, Elizabeth, 2 story, basement, brick, steel sanitarium addition, Bonnie Burn Sanitorium. $150,000. Architect not selected.

N. Y., New York—Beth David Hospital, 1824 Lexington Ave., c/o H. Uris, 271 Madison Ave., hospital, 1824 Lexington Ave. $1,000,000. Project in abeyance. Noted Jan. 15.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids in August or later, nurses' home and male dormitory, at Fordham Hospital. $150,000 each. B. R. Swartzburg, 2 West 46th St., archt. Noted Jan. 1 and Mar. 12.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids about September, general contract nurses' home addition, Welfare Island. $500,000. Schwartz & Gross, 347 5th Ave., archts. Noted Mar. 19.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids in fall or later isolation pavilion, North Brothers Island. $250,000. G. M. McCabe, 95 5th Ave., archt. Noted Sept. 25.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids in fall or later, general contract contagious ward building at Riverside Hospital, North Brothers Island. $500,000. Schwartz & Gross, 348 5th Ave., archts. Noted May 19.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids in August, general contract 4 story, 95 x 139 ft. male dormitory, at Metropolitan Hospital, Welfare Island, opposite 83rd St. $325,000. M. Bernstein, 2 Columbus Circle, archt. Noted Apr. 2.

N. Y., Tottenville (sta. Staten Island) — Richmond Memorial Hospital, 375 Prince Bay Rd., 2 story, basement, brick, steel addition, plain found., Kingsland Ave. and Prince Bay Rd. $150,000. **Maturity probably soon.** Architect not selected.

Pa., Erie—Hamot Hospital, F. W. Brouitt, acting dir., 4 East 2nd St., plans by Crow, Lewus & Wick, 200 5th Ave., New York, 6 story, basement, irregular sized, brick, limestone hospital, incl. storage, pharmacy, solarium, billiard room, 2 operating rooms, living quarters, $1,000,000; also brick, steel nurses home, $250,000, bath on East 2nd St. **Maturity late 1932.**

Pa., Erie—Hamot Hospital, F. W. Brouitt, acting dir., 4 East 2nd St., soon lets contract additional wing, $150,000. Bids in. Crow, Lewis & Wick, 200 5th Ave., New York, archts.

Tex., Houston—City and Harris Co. plans by A. C. Finn, Bankers Mortgage Bldg., J. Finger, Democratic Bldg., and C. G. Parnall, 9 story main hospital building, 2 story out-patients clinic adjoining, and nurses' home, Buffalo Dr. near Sabine St. $1,500,000.

Que., Montreal — Bd. Trustees Montreal Children's Hospital, hospital, St. Antoine St.

Que., Montreal — St. Mary's Hospital, 1923 Dorchester St., D. A. Hingston, pres., 1000 Sherbrooke St. W., hospital. $1,000,000.

BIDS ASKED

Conn., Newtown—June 30, by Fairfield State Hospital Comn., Old Senate Chamber, State House, Hartford, 2nd group buildings for new insane asylum, incl. reception hospital, general hospital, dining hall, nurses home, married employees home, male employees home, female employees home, 5 staff houses, all rein.-con., brick, steel, Mile Hill. $1,250,000. W. P. Crabtree, 410 Asylum St., Hartford, archt. Noted Mar. 26.

Mass., Belmont—June 16, by McLean Hospital, F. H. Packard, 175 Pleasant St., and Wadsworth, Hubbard & Smith, 11 Beacon St., Boston, 3 story, basement, brick, stone nurses' home, Hospital Grounds, Waverly Sect. $150,000. Noted May 7.

Mass., Westfield—June 16, by Noble Hospital, 105 West Silver St., altering and constructing 4 story, 50 x 125 ft., brick, steel hospital addition. $250,000. M. B. Harding, 10 Main St., archt. Noted Apr. 16.

N. J., Holmdel—June 9, by Dpt. Institutions & Agencies, State Office Bldg., Trenton, general contract 3 story, basement, 65 x 105 x 245 ft., brick, steel nurses home, New Jersey City Hospital grounds. $150,000. Div. Architecture & Constr., State Office Bldg., Trenton, archts. Noted May 14.

N. Y., New York—Bronx Maternity Hospital, 1072 Grand Concourse, bids about July 15, general contract hospital, 1072 Grand Concourse. B. H. Whinston, 6 East 46th St., archt. Noted Jan. 8.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids about July 15, nurses' home $700,000, women's pavilion $1,750,000, power plant $400,000, at Harlem Hospital. Sloan & Robertson, 420 Lexington Ave., archts. Noted May 14.

CONTRACTS AWARDED

Conn., Hartford — City, W. E. Batterson, mayor, general contract 6 story, brick, steel, stone hospital, to F. L. Rice, 12 Winchester St., $297,400. Noted June 4.

Minn., St. Paul—Minnesota Lutheran Conference, L. B. Benson, supt., 1082 Hague Ave., 5 story, basement, brick, steel, rein.-con. hospital, Capitol and Como Aves., to Swenson & Haakanson, 914 Builders Exchange. Est. $600,000.

Mo., Jefferson City—St. Mary Hospital, c/o Mother Superior, 4 story, basement, rein.-con., brick addition, to Wimmer Contg. Co., Victoria Bldg., St. Louis; plumbing, to McNamara Plumbing Co., 6235 Delmar Blvd., St. Louis; heating, to Elliott & Barry Eng. Co., 4060 West Pine Blvd., St. Louis; electrical wiring, to E. O. Dorsch Electric Co., 1418 Pine St., St. Louis. Noted Apr. 30.

Neb., Omaha — Methodist Hospital, C. C. Wilson, supt., concrete, brick, steel hospital, to Parsons Constr. Co., 210 Grain Exch. Bldg., Omaha; reinforcing steel and steel forms, to Concrete Eng. Co., 1141 North 11th St.

O., Newark—C. Frey, clk. Licking Co. Hospital Comn., general contract 3 story, basement, 160 x 280 ft., brick, concrete tuberculosis hospital, to Hawkins Constr. Co., Newark, $137,340; plumbing and heating, to H. C. Sponhauer, Galion, $33,763; electrical work, to Electric Power & Equipment Co., 51 East Chestnut St., Columbus, $6,499; laundry equipment, to Troy Laundry Mchy. Co., Citizens Bldg., Cleveland, $6,225. Grand total $183,827. Noted Apr. 30.

O., Ravenna—Robinson Memorial Hospital, Portage Co., general contract, incl. wiring, ventilating, heating, hospital, South Chestnut St., to P. L. Frank Contg. Co., Ravenna, $150,000. Noted Dec. 4.

Pa., Phila.—St. Agnes Hospital, Broad and Mifflin Sts., 5½ story, basement, 51 x 171 ft., rein.-con., brick, steel, stone, plain found., 15th and Mifflin Sts., to J. McShain, 1610 North St. Est. $500,000.

Que., Montreal—Bd. Governors, Royal Victoria Hospital, hospital, University St. above Pine Ave., to A. F. Byers & Co., 1226 University St. Est. $246,000. Noted Oct. 2.

CHURCHES

PROPOSED WORK

Conn., Newington—St. Marys Roman Catholic Parish, J. Timmons, pastor, new church, Newington and Willard Aves. $150,000. Architect not selected.

Mass., Boston—Our Lady of Lourdes Roman Catholic Parish, J. F. Kelley, 46 Brookside Ave., sketches by E. T. P. Graham, 171 Newbury St., 1 story, basement, brick, stone, plain found., Montebello Rd. and Marmion St. $150,000.

Mass., Greenfield—First Church of Christ, F. D. Packard, 318 Main St., Scientist Church, East Main St. $150,000. Architect not selected.

Mass., Melrose — Unitarian Congregational Church, H. T. Secrist, pastor, Emerson St., church, parish house, Emerson St. $150,000. Architect not selected.

N. H., Exeter—St. Michael's Roman Catholic Church, D. J. Cotter, pastor, sketches by J. J. O'Shaughnessy, 80 Boylston St., Boston, Mass., convent. $150,000.

N. J., Garfield—First Presbyterian Church, R. W. Key, pastor, 132 Palisade Ave., 1 story, basement, brick, steel Sunday school, Palisades Ave. $150,000. J. H. Dynes, 767 Stuyvesant Ave., Lyndhurst, archt. Project in abeyance, no funds available. Noted Feb. 19.

N. J., Jersey City—St. Johns Roman Catholic Church, P. W. Smith, pastor, 3026 Hudson Blvd., Jersey City, altering 2 story, basement, brick, steel church, Hudson Blvd. and Van Winkle Ave. $150,000. **Maturity probably soon.** Architect not selected.

N. J., Paterson—Owner, c/o E. R. Coe, archt., 136 Washington St., 2 story, basement, brick, steel church. $150,000. **Maturity in September.** Noted May 28.

N. J., Pleasantville — Epiphany Lutheran Church, E. A. Lebo, pastor, bids in September, general contract 2 story, basement, brick, steel church, parish house, Ansley Park. $150,000. E. A. Meas, Charlotte, N. C., archt. Noted May 21.

N. Y., New York—Madison Avenue Methodist Episcopal Church, bids late in summer, 1 story, basement, brick, Park Ave. and 60th St. $1,000,000. Cram & Ferguson, 258 Boylston St., Boston, Mass., archts. Noted Jan. 15.

Pa., Pittsburgh—Central Presbyterian Church of Allegheny, First Presbyterian Church of Allegheny, both N. S. Pittsburgh, and Second Presbyterian Church of Pittsburgh, 8th St., G. W. Shelton, pastor, sketches by G. E. Savage, Witherspoon Bldg., Phila., 100 x 180 ft., stone church, incl. 2 auditoriums, 2,000 seating capacity, North Ave. $1,000,000.

BIDS ASKED

Conn., Hartford — St. Augustine's Roman Catholic Parish, M. W. Barry, pastor, taking bids 1 story, 12 x 125 ft., stone church addition, Campfield Ave. $150,000. Whiton & McMahon, 805 Main St., archts. Noted Feb. 26, under "Schools."

Ind., Bloomington—June 15, by University Lutheran Church, A. Stegen, pastor, brick, steel church. $150,000. Noted Apr. 16. A. Grindle, Bloomington, archt.

Mass., Pittsfield — June 12, by St. Mark's Roman Catholic Society, J. M. Leonard, pastor, 1 story, 55 x 180 ft., granite, concrete, artificial stone church, West St. $350,000. W. Donohue, 1200 Main St., Springfield, archt. Noted May 28.

Que., Rigaud—Congregation of Sisters of St. Francis, Baie St. Paul, taking bids convent. J. S. Bergeron, 143 St. John St., Quebec City, archt. Noted Mar. 19.

CONTRACTS AWARDED

Ark., Hot Springs—Sisters of Our Lady of Charity, c/o Mother Superior, 2 story, boiler room, 82 x 157 ft., concrete, brick convent, concrete found., to R. Higgins, Hot Springs. Noted June 4.

Mass., Arlington (br. Boston) — Church of Our Savior, W. N. Bixby, pastor, 38 Marathon St., 2 story, basement, irregular sized, stone, stucco parish house, church tower, plain found., to W. J. Coumans, 12 Church St., Watertown. Est. $150,000. Noted May 21.

Mass., Springfield—Our Lady of Mt. Carmel, J. M. Crouse, pastor, altering and constructing brick, stone, church addition, plain found., Williams St., to J. G. Roy & Sons, 21 Silver St. Est. $150,000.

Minn., St. Paul—Christ Episcopal Church, W. H. Lightner, chn. Building Comn., 212 Endicott Bldg., rein.-con., stone church, rectory, to P. O. Nasvik, 1368 Ashland Ave. Est. $250,000. Noted Feb. 5.

Mo., St. Louis—St. Anthony of Padua Roman Catholic Church, B. Wewer, pastor, and Franciscan Fathers of Mississippi Valley, 3 and 4 story, basement, rein.-con., brick monastery, to Mississippi Valley Constr. Co., 807 Chestnut St. Est. $150,000. Noted May 28.

Ont., Toronto—Deer Park United Church, 127 St. Clair Ave. W., general contract altering and constructing 1 and 2 story, basement, brick, stone, concrete church and Sunday school, to Witchall & Son, 156 St. Helens Ave.; electrical work, to Bennett & Wright, 72 Queen St. W. Est. $150,000. Noted May 28.

SCHOOLS

PROPOSED WORK

Ariz., Tucson—Pima School Dist., c/o W. A. Jast, clk., sketches by R. Place, Tucson, altering and improving Roskruge School. $200,000. Noted May 21.

Conn., Darien—Town, School Bd., plans by Starrett & Van Vleck, 393 7th Ave., New York, 2 story, basement, brick, cast stone, terra cotta school. $150,000.

Conn., New Haven—Yale University plans by H. C. Pelton, 415 Lexington Ave., New York, 2 pavilions—women's surgical buildings.

Conn., Storrs—Connecticut Agricultural College, C. C. McCracken, pres., plans by Perry & Bishop, 17 Court St., New Britain, 30 x 58 ft. infirmary and 30 x 35 ft. T-shaped faculty buildings, brick, stone. $150,000.

Ill., East St. Louis—East St. Louis Catholic High School Bd., plans by H. P. Hess, 1001 Ambassador Bldg., St. Louis, Mo., 3 story, basement, 64 x 75 ft., rein.-con., brick high school.

Mass., Greenfield—Town, T. M. Hayes, chn. School Comn., 3 Bank Row, Junior High School, Shattuck Park. $200,000. Architect not selected.

Mass., Marlboro—Hillside School for Boys, F. Shumway, pres., plans by J. F. Bigelow, 64 Highland St., rebuilding administration buildings, dormitory. To exceed $150,000.

Mass., Quincy—City, Dpt. School Buildings, plans by Hutchins & French, 11 Beacon St., Boston, altering and constructing 2 story, basement, brick school addition, 92 Newbury St., Atlantic Sect. $150,000.

Minn., Glencoe—Bd. Educ., E. H. Jungelaus, clk., 2 or 3 story school. $220,000.

N. H., Andover — Proctor Academy, C. B. Wetherell, head master, soon lets contract brick school, dormitory. $150,000. Kilman, Hopkins & Greeley, 9 Park St., Boston, Mass., archts. Noted Mar. 12.

N. J., Clifton—Bd. Educ., High School, Grade School, 2 story, basement, brick, steel, rein.-con., Conrad Ave., Broad and Grove Sts. $150,000. **Maturity probably soon.**

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Schools (Continued)

N. J., Clinton—Bd. Educ., High School, plans by Lee & Hewitt, 152 Market St., Paterson, 2 story, basement, brick, steel, rein.-con. addition. Gregory Ave. $150,000.

N. J., Elizabeth — Bd. Educ., 417 South Broad St., revised sketches by H. B. Brady, Inc., 333 North Broad St., 2 story, basement, brick, steel, rein.-con. addition to Junior High School, Loomis St. $250,000. Noted Dec. 25.

N. J., Englewood — Englewood School for Boys, 35 Dwight Pl., sketches by L. C. Licht, 4 Dean St., 2 story, basement, brick, steel school. $150,000. Noted Apr. 30.

N. J., Fair Lawn—Bd. Educ., Boro Hall, 2 story, basement, brick, steel, rein.-con., Henderson Terrace Sect. $150,000. **Maturity probably soon.** Architect not selected.

N. J., Hillsdale—Bd. Educ., G. M. Strohsohl, dist. clk., will not build 2 story, basement, brick, steel, rein.-con. Junior High School, Demarest Ave. $150,000. Project abandoned. Noted Apr. 29.

N. J., Mahwah—Bd. Educ. bids after June 15, 2 story, basement, brick, steel school. $150,000. A. J. Rogers, 55 West 42nd St., New York, archt. Noted May 21.

N. J., Midland Park—Bd. Educ., 2 story, basement, brick, steel school. $150,000. **Maturity about September.** $150,000. Noted May 7.

N. J., Moonachie—Bd. Educ., Junior High School, 2 story, basement, brick, steel, rein.-con. $150,000. **Maturity about 1931.** J. L. T. Tillack, 173 Main St., Hackensack, archt. Noted May 21.

N. J., Morristown—Bd. Educ., 50 Early St., will not build 2 story, basement, brick, steel, rein.-con., Florhan Park. $150,000. Project abandoned. Noted May 14.

N. J., Morristown—Bd. Educ., 50 Early St., sketches 2 story, basement, 40 x 150 ft., brick, steel, rein.-con. school, 2 wings, Speedwell Ave. $150,000.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., addition to P. S. 27, Nelson and Hicks Sts. $300,000.

N. Y., Jamaica—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, addition to P. S. 131, 83rd Ave. and 172nd St. $300,000.

Pa., Arnold—Bd. Educ., C. L. Cotton, pres., bids this summer, 2 story, basement, 65 x 120 ft., white brick, steel high school, with workshops in basement, Woodmont St. $150,000 bonds voted for same. P. R. L. Hogner, Smithfield Bldg., Pittsburgh, archt. Noted May 28.

Pa., McKeesport—Bd. Educ., J. B. Ritchey, pres., Ariel Bldg., plans by C. R. Moffitt, 304 Masonic Temple, Industrial School, rear of high school. $600,000. C. L. Wooldridge, Fulton Bldg., Pittsburgh, consult, engr. **Maturity about 1 year.**

Tenn., Chattanooga—Bd. Educ. Hamilton Co., school, Red Bank St., $125,000; school in Silverdale Suburb, $45,000.

Ont., Toronto—Bd. Educ., 155 College St., plans by C. E. Dyson, 155 College St., and takes bids about June 15, 3 story, basement, concrete, bric, stone, steel school addition, incl. administration room, kindergarten, Morse St. $175,000.

Ont., Toronto—Bd. Educ., East York Twp., 443 Sammon Ave., plans by H. Martin, 59 Barker Ave., 2 story, basement, brick, stone, concrete addition to Secord School, Danforth Ave. $165,000.

Que., Montreal—Roman Catholic School Comn. plans by Viau & Venne, 59 St. James St. W., steel, brick school, Prebeuf St., for St. Stanislaus Parish. $250,000.

BIDS ASKED

Ark., Jonesboro—July 7, by Bd. Trustees Agricultural & Mechanical College, 4 story, light buff face brick administration building. $350,000.

Del., Marshallton—Delaware School Foundation, A. J. Taylor, vice pres., Du Pont Bldg., Wilmington, bids about July 1, general contract Marshallton Consolidated School, 2 story, basement, brick, rein.-con., steel, plain found., Brandywine Hundred Dist. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts. Noted May 21.

Del., Wilmington — June 15, by Guilbert & Betelle, archts., 20 Branford Pl., Newark, N. J., 2 story, basement, brick, steel, rein.-con. school, plain found., for Delaware School Foundation, Du Pont Bldg., $150,000. Noted June 11.

Del., Wilmington—Delaware School Foundation, Du Pont Bldg., bids about July 1, general contract School 25, 2 story, basement, brick, steel, rein.-con., plain found. $150,000 Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts. Noted June 4.

Del., Wilmington—June 15, by Bd. Educ., Wilmington, 2 story, basement, 143 x 320 ft., brick, rein.-con., plain found. Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts.

Ind., Evansville — St. Anthony Parish bids about June 15 (extended date), Catholic Parochial School, 2 story, basement, 66 x 217 ft., incl. gymnasium, auditorium, stage, rein.-con., brick, stone, Columbia St. and 2nd Ave. $150,000. E. C. Berendes, 121 Northwest 4th St., archt. Noted May 14.

Ind., Laporte — June 15, by School Comrs., High School, 2 story, basement, 78 x 217 ft., rein.-con., Harrison St. Former bids rejected. $150,000. G. W. Allen, Laporte, archt. Noted May 14.

Ind., Wheatfield—June 22, by School Comrs., brick, steel school. $150,000. J. Bruck, Kentland, archt. Noted Apr. 30.

La., Baton Rouge—July 21 (extended date), by Louisiana State University and Agricultural Mechanical College, Fine Arts Bldg., 3 story, basement, incl. recital hall, also 3 story, basement, field house and recreation center. Weiss, Dreyfus & Seiferth, Maison Blanche Bldg., New Orleans, archts. Noted June 4.

Md., Brooklyn (sta. Baltimore)—June 17, by Bd. Awards, Baltimore, 2 story, brick, hollow tile, limestone, granite, structural steel school addition, 4th and Pontiac Sts. G. R. Callis, 13 Melvin Ave., Baltimore, archt. V. R. P. Saxe, 217 North Calvert St., Baltimore, engr.

Mass., Boston—June 24, by Dpt. School Buildings, 2 story, basement, brick, limestone, steel intermediate school, plain found., Hurlcroft and Alicia Rds., Dorchester. $850,000. J. M. Gray, 175 High St., archt. Noted Apr. 16.

Mass., Cambridge — Stone & Webster, Inc., constr. mgrs., 49 Federal St., Boston, taking bids superstructure 5 story, basement, 50 x 300 ft., brick, limestone, steel chemistry building, physics laboratory, plain found., Charles River Rd., for Massachusetts Institute of Technology, Charles River Rd. $800,000. Coolidge & Carlson, 89 State St., Boston, archts. Noted Dec. 18, under "Contracts Awarded."

Mass., Everett—City, Schoolhouse Building Comn., taking bids 2 story, basement, brick, stone, rein.-con., steel addition to Junior High School, concrete found., Bway. $500,000. Desmond & Lord, 1 Beacon St., Boston, archts. Noted May 14.

Mass., Framingham—June 23, by Town, R. Kerwin, chn. Building Comn., 3 story, brick, steel high school addition. $150,000. G. F. Marlowe, 240 Boylston St., Boston, archt. Noted June 4.

Mich., Quincy—June 17, by L. O. DeWolff, secy., 2 story, basement, 135 x 153 ft., brick, rein.-con., stone, steel high and grade school, plain found., Dist. 2. $150,000. Lane, Davenport & Bennett, Inc., 1017 Charlevoix Bldg., Detroit, archts.

N. H., New Ipswich—Appleton Academy, L. E. Smith, principal, taking bids altering and constructing 2 story, basement, brick, school addition, plain found. $150,000. H. L. Meacham, 120 Front St., Worcester, Mass., archt.

N. J., Paterson—Bd. Educ., City Hall, bids about Aug. 1, general contract School 18, 2 story, basement, brick, steel, rein.-con., Riverside Sect. $150,000. Fanning & Shaw, 49 Ward St., Paterson, archts. Noted May 28.

N. J., Peapeck — June 12, by Bd. Educ., Peapeck-Gladstone Boro, Main St., 2 story, basement, brick, steel, school addition. $150,000. Former bids rejected. A. Merchant, 1 Elm Row, New Brunswick, archt. Noted May 26 Daily.

N. Y., Aurora—June 12, by I. L. Price, chn. Bd. Educ., altering and constructing addition to school, Union Free School Dist. 1. $350,000. A. R. Merritt, 800 Erie Co. Bank Bldg., Buffalo, archt.

N. Y., Jamaica—June 15, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, altering and constructing additions to P. S. 117, 84th Dr., 143rd and 144th Sts., for Bd. Educ., 500 Park Ave., New York.

N. Y., Rochester—Aug. 1, by Bd. Educ., grade school, Dist. 3, town of Irondequoit. $200,000.

O., Canton—June 30, by Firestone & Christman, archts., Renkert Bldg., 3 story, 58 x 123 ft., brick, steel, concrete high school, incl. auditorium, gymnasium, North Industry St., for Stark Co. $150,000, terra cotta.

Pa., Pittsburgh—June 17, by Bd. Educ., H. W. Cramblet, secy., Administraton Bldg., general contract Larimer Elementary School, brick, steel, Larimer Ave. $150,000-$200,000. G. M. Rowland, Bakewell Bldg., archt.

Pa., State College—June 16, by C. Z. Klauder, archt., 1429 Walnut St., Phila., Home Economics, brick, steel, for Pennsylvania State College. R. B. Hetzell, pres.

Tex., Dumas—Bd. Educ. taking bids 2 story, brick, rein.-con. high school, incl. auditorium, offices, 60,000 sq.ft. floor space, plain found., $150,000. G. A. Carlander, 1016 Fisk Medical & Professional Bldg., Amarillo, archt. Noted Apr. 16.

CONTRACTS AWARDED

Calif., Claremont—G. B. Kaufmann, archt., Union Book Bldg., Los Angeles, rein.-con. library, to Wurster Constr. Co., Architects Bldg., for Claremont College. $175,000. Noted May 14.

Calif., Pasadena — California Institute of Technology, 3 story, basement, 60 x 134 ft., and 100 x 125 ft., rein.-con. laboratory, East California St., to W. C. Crowell, 495 South Bway., Los Angeles. $150,000. Noted May 28.

Ind., Boone Grove — School Comrs., general contract rein.-con. brick school, to M. B. Welch, Rockville. Est. $150,000. Noted May 7.

Ia., Des Moines—Drake University Dormitory Assn., H. J. Clark, member Bd. Directors, 3 story, basement, 100 x 100 ft., rein.-con., brick dormitory, to Garmer & Stiles, 519 West 13th St., $86,362. Noted Apr. 23.

Kansas—Bd. Educ. Dist. 2 Wyandotte Co., 2 story, basement, 153 x 248 ft. rural high school, near Bethel, to Busboan Bros., Fairbury, Neb., $95,500. Noted May 7.

Kan., Bethel — Bd. Educ. Dist. 2 Wyandotte Co., c/o H. J. Perry, Rural Route 4, general contract Rural High School, 2 story, basement, 70 x 248 ft., rein.-con., brick, incl. science rooms, administration, commercial, auditorium and stage, to E. D. Shuck, Peoples Natl. Bank Bldg., Kansas City. $142,691 with alternates. Noted Apr. 9.

Md., Baltimore — Bd. Awards, altering and constructing School 220, 2 story, basement, 62 x 107 ft., brick, structural steel, rein.-con. addition, to W. E. Bickerton Contg. Co., 515 Cathedral St., $63,118. Noted May 21.

Mass., Lexington—Town, Bd. Selectmen, altering and constructing 2 story, basement, brick, stone addition to Adams School, plan found., to Vappi & Ferguson Co., Inc., 515 Mass. Ave., Cambridge. Est. $150,000.

N. H., Exeter—Phillips Exeter Academy, L. Perry, headmaster, altering and constructing 3 brick dormitory units to J. Gascoigne & Co., Beacon St., Boston, Mass. Est. $150,000. Noted May 21.

N. J., Clifton—Bd. Educ., High School Bldg., general contract School 3, 2 story, basement, 100 x 130 ft., brick, steel, to S. Pellegrino, 198 Washington Pl., Passaic. $210,000; plumbing, roofing, sheet metal and heating, and ventilating, to G. H. Van Varick, 28 Hellman St., $20,000 and $16,800 respectively; electrical work, to Tri-Service Electric Co., 596 21st Ave., Paterson, $14,219; steel and iron, to J. K. Cooke & Son, Inc., 210 Clifton Blvd., Athenia, $14,740. Grand total, $275,759. Noted May 7.

N. Y., New Rochelle—Bd. Educ., for Jefferson School, to W. W. Constr. Co., 15 East 40th St., New York. Est. $265,000.

Pa., Pittsburgh—Bd. Educ., H. W. Cramblet, secy., general contract Mifflin Elementary School, 3 story, basement, 103 x 213 ft., brick, hollow tile, stone, rein.-con., to Davis Smith Co., Real Estate Savings & Trust Bldg., $207,100. Noted May 14.

Wis., Manitowoc—Bd. Educ., marble for Junior High School, to W. Salmon Marble Co., Milwaukee, $6,070; tile, to Butter & Son, 420 Milwaukee St., Milwaukee, $5,903; terrazzo, to J. Widi, Green Bay, $3,863; heating and ventilating, to H. G. Kallies, Manitowoc, $44,775; plumbing, to W. Elliott Co., Two Rivers, $16,626; electricity, to Anderson Electric Co., Manitowoc, $8,610. Grand total $85,847. Noted May 7.

Wis., Sturgeon Bay—Bd. Educ., general contract 2 story, 120 x 130 ft. high school addition, to L. Nebel, Sturgeon Bay; plumbing, to Kissel Bros., Green Bay; electrical wiring, to Kretsch Bros., Kiel. Noted Mar. 30.

Ont., Belleville—Bd. Educ., Church St., general contract 2 story, basement, brick, stone, concrete additions to Queen Victoria and Queen Alexandria Public Schools, to F. R. Wilford Co., Ltd., 24 William St. N., Lindsay; plumbing, heating, ventilating, to Howe & Hagerman, 191 Front St., Belleville; electrical work, to Finkle Electric Co., 123 Front St. Est. $150,000.

Ont., Kenora—Bd. Educ., general contract 2 story, basement, brick, concrete, stone high school, 3rd St., to Kelly & Kimberly, Kenora. Est. $150,000. Noted May 14.

Ont., Toronto — Bd. Educ., 155 College St., 3 story, basement, concrete, brick, stone, steel, Humberside Collegiate Institute, masonry, to Hawken & Kelly, 681 Dovercourt Rd., $140,884; carpentry, to J. W. Hudson & Co., 2355 Dundas St., W., $21,948; structural steelwork, to Reed & Brown, Fleet St., $40,470; lath and plastering, to E. A. Murby, 209 De Grasse St., $25,-131; marble and terrazzo, to Italian Mosaic & Tile Co., 250 Madison Ave., $14,095; ventilation, to A. Matthews, 256 Adelaide St. W., $7,722; plumbing and heating, to W. J. McGuire, 91 Jarvis St., $30,711; electric wiring, to Canadian Comstock Co., 80 King St. W., $20,875. Grand total $301,836. Noted Feb. 5.

Que., Montreal — Roman Catholic School Comn., V. Dore, pres., 117 Ste. Catherine St., school for Parish of St. Alphonse d'Jouille, to Dansereau, Ltd., 1387 Bernard St. W., $232,250. Noted Mar. 26.

Que., Verdun—J. S. Archibald, archt., 1440 St. Catherine St. W., Montreal, altering and constructing 3 story, T-shaped steel, concrete, brick addition, for Verdun Protestant School Bd., to J. MacGregor Ltd., 1410 Stanley St. Noted May 14.

THEATRES

PROPOSED WORK

Calif., Beverly Hills — Passion Patheon Ltd. plans by D. Uhl, California Bank Bldg., rein.-con. open air theatre, $150,000.

Calif., Los Angeles—Fox West Coast Theatres, Inc., 1609 West Washington St., plans by S. C. Lee, 2404 West 7th St., rein.-con. theatre, 2,000 seating capacity, Florence and Compton Aves. $250,000.

Mass., Springfield—Fox Theatres Corp., 850 10th Ave., New York, A. J. Benline, 30 Church St., New Haven, Conn., sketches by T. W. Lamb, 644 8th Ave., New York, brick, steel theatre, office building, Main St. $1,000,000.

Mass., Worcester — Fox New England Theatres, Inc., A. J. Benline, 30 Church St., New Haven, Conn., rebuilding theatre, 3,000 seating capacity, Front St., recently destroyed by fire. $159,000 or more. Architect not selected.

N. J., Westfield—Realty Investment Co., R. L. DeCamp, secy., 566 Colonial Ave., 2 story, basement, brick, steel theatre. $150,000. **Maturity probably soon.** Architect not selected.

Tex., Dallas — Flippen-Prathes Realty Co., 4600 Preston Rd., new theatre, Preston Rd. and Mockingbird Lane. $150,000. Hughes-Franklin Co., Los Angeles, Calif., lessee.

Va., Roanoke—Community Theatre Corp., M. J. Patsel, pres., theatre, in suburb of Roanoke. $150,000.

Va., Roanoke—Paramount Publix Theatres, Paramount Bldg., New York, theatre. To ex-

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Theatres (Continued)

ceed $150,000. Rapp & Rapp, Paramount Bldg., New York, archts. Indefinite when owner will award contract or whether new bids will be taken. Noted Nov. 13.

CONTRACTS AWARDED

N. H., Franklin—S. Kurson, 179 Exchange St., Bangor, Me., 1 and 2 story, 50 x 175 ft., brick theatre, store and office, to Jandris Constr. Co., Blanchard Pl., Gardner, Mass. Est. $150,000. Noted May 28.

N. Y., New York—Loews Theatres, Inc., 1540 Bway., general contract theatre, 72nd St. and 3rd Ave., to Aronberg Fried Co., Inc., 21 East 40th St., New York. Est. $750,000. Noted Apr. 2.

BANKS

BIDS ASKED

Que., Montreal—Montreal City and Dist. Savings Bank, 262 St. James St. W., taking bids bank, St. Denis and Rachel Sts. $225,000. A. H. Lapierre & F. Dumfries, 10 St. James St. E., archts.

CONTRACTS AWARDED

N. J., Paterson—H. B. Crosby & A. E. Sleight, archts., 125 Ellison St., general contract 2 story, 80 x 85 ft., brick, steel bank, Bway. and West Bway., to J. H. Steele & Son, 48 North 2nd St. Est. $150,000. Noted June 4.

OFFICES

PROPOSED WORK

Calif., Los Angeles — Legal Tower Ltd., M. Lombardi, pres., Union Bank Bldg., plans by A. Curlett, 1012 Union Bank Bldg., 13 story, basement, Class A, steel office, 1st St. and Bway.

Calif., Oakland—Owner, c/o C. W. McCall, archt., 1404 Franklin St., sketches 6 story, basement, steel, concrete office, store, uptown district. $150,000.

N. Y., New York—General Realty & Utilities Corp., 285 Madison Ave., 25 story office, 5-11 Albany St., 125 Cedar St., and 135 Washington St. $1,000,000. **Maturity in fall or early spring.** Noted Jan. 15.

N. Y., New York—A. Grosfeld, 801 3rd Ave., will not build office, store, showroom, 309 East 48th St., $500,000. Project in abeyance. Noted Jan. 8.

N. Y., New York—Houston Properties, 10 East 40th St., 50 story office, Madison Ave. from 38th to 39th Sts. **Maturity late in 1932.** Noted Jan. 9, 1930.

N. Y., New York — Insurance Company of North America, 111 John St., 26 story, 87 x 137 x 154 ft. office, John, Cliff and Gold Sts. $2,500,000.

N. Y., New York—J. Medvin, 134 West 33rd St., office, stores, showrooms, 134 West 33rd St. $200,000. R. H. Segal, 475 5th Ave., archt. **Maturity after January.** Noted Apr. 24, 1930.

N. Y., New York—New York Stock Exchange, 11 Wall St., office, stock exchange addition, 20 Broad St. $10,000,000. **Maturity in fall or later.** Cross & Cross, 385 Madison Ave., archts. Noted May 26.

N. Y., New York—S. Silver, c/o J. Unger, archt., 93 Main St., Flushing, will not build 38 story, 100 x 105 ft. office, 42nd St. and 2nd Ave. $4,500,000. Project abandoned. Noted Sept. 4.

Tex., Tyler — Gulf States Telephone Co., plans by E. A. Nolan & Son, Tyler, 6 story, brick, rein.-con., steel office, South College St. $150,000.

CONTRACTS AWARDED

Mo., Kirkwood—Missouri State Hy. Comm., Jefferson City, 2 story, 42 x 52 ft. office, and 1 story, basement, 66 x 98 ft. garage, to M. E. Gillioz, Monett. $70,000. Noted May 14.

STORES

PROPOSED WORK

N. J., Caldwell—Owner, c/o E. R. Coe, archt., 136 Washington St., Paterson, sketches 2 story, 60 x 125 ft., brick, steel store, office. $150,000.

N. Y., New York—One Hundred Nineteen East 37th Street Corp., c/o J. V. Coyle, archt., 250 Park Ave., bids early in July general contract store, apartment, 117 East 37th St. $500,000. Noted Dec. 4.

N. Y., New York—Raymond Rubin Co., 10 West Fordham Rd., plans by Goldner & Goldner, 19 West 44th St., 4 story store, apartment, Watson and Wards Aves. $150,000.

BIDS ASKED

N. Y., New York—See "Contracts Awarded".

CONTRACTS AWARDED

N. Y., New York—Academy Housing Corp., 1750 Randall Ave., 6 story, 65 x 136 ft. store, apartment, Commonwealth and Randall Aves., separate contracts. $275,000. Springsteen & Goldhammer, 40 East 49th St., archt. Noted Feb. 19.

N. Y., New York—Empire Square Realty Co., 1931 Bway., store, office, Bway. and 65th St., separate contracts. $150,000. Noted Apr. 30.

O., Youngstown—G. M. McKelvey Co., 210 West Federal St., 4 story, basement department store addition, also constructing service and delivery building, Federal St., to Heller Bros. Co., Thurmon and Furnace Sts. $150,000.

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LOFTS

PROPOSED WORK

Calif., Los Angeles — M. J. Connell, M. J. Connell Bldg., plans by J. T. Payne, West 64th Pl., 13 story, basement, 150 x 281 ft. loft, store, 17th and Los Angeles Sts. To exceed $1,000,000.

N. Y., New York—Clemons Realty Co., 570 7th Ave., bids in November, loft, store, 211 West 20th St. $300,000. J. H. Knubel, 570 7th Ave., archt. Noted Jan. 8.

BIDS ASKED

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

N. Y., New York—Corporation, c/o G. F. Crane, 52 Wall St. and Trinity Church, 15 story, loft, store, storage, 157 Chambers St., separate contracts. $600,000. V. Mayper, 110 West 40th St., archt. Excavation in progress. Noted Jan. 29.

PUBLIC

PROPOSED WORK

Calif., Los Angeles — INDUSTRIAL and WARD—State of California, Sacramento, Girls' Industrial Building and wards at Pacific Colony. $182,000 available.

Calif., Modesto—COURT HOUSE and HALL of RECORDS—Stanislaus Co. election $250,000, court house and hall of records building. Noted Apr. 3, 1930.

Ind., Evansville — COLISEUM — Bd. Comrs. Vanderburg Co., sketches by F. E. Fowler, Central Union Bldg., remodeling and constructing 2 story, basement, brick, steel coliseum. $150,000.

Mass., North Adams—LIBRARY—City, W. Johnson, mayor, City Hall, plans by Coolidge & Carlson, 89 State St., Boston, library. $150,000 or more.

Mich., Grand Rapids—COURT HOUSE—Kent Co. Supervs., plans by Osgood & Osgood, Grand Rapids, reconstructing and constructing 4 story, brick, steel, rein.-con. stone addition to county court house, also tunnel connecting both buildings. $700,000.

Neb., Lincoln — MUNICIPAL — City, T. H. Berg, city clk., plans by Davis & Wilson, 525 South 13th St., concrete, brick, stone, Hay Market Sq. between 9th and 10th, P and Q Sts. $150,000. Noted June 4.

N. J., Dover—LIBRARY—Bd. Trustees, 3 West Clinton St., sketches 1 story, basement, brick, steel public library, plain found. $150,000.

N. Y., New York—BIOLOGICAL LABORATORY—Dpt. Health, 505 Pearl St., bids about latter part July, biological laboratory, 16th St. $500,000. Sibley & Fethersone, 205 West 42nd St., archts. Noted Jan. 15.

N. Y., New York—BORO HALL and COURT HOUSE—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., bids in July or August, general contract 14 story county building, Grand Concourse, 158th and 161st St. $7,000,000. J. H. Freedlander, 681 5th Ave., and M. Hausle, 3307 3rd Ave., archts. Noted Apr. 16.

N. Y., White Plains—MUSEUM—Westchester Co. Historical Society, County House Rd., Elmsford, museum, Bronx River Parkway. To exceed $150,000. **Maturity indefinite.**

Tex., Big Springs — CITY HALL, AUDITORIUM, etc.—City, c/o J. B. Pickle, mayor, and V. R. Smitham, mgr., election June 16, $200,000, new city hall, auditorium, central fire station. Address Mayor. Noted Nov. 28, 1929.

Tex., Fort Worth — POLICE STATION and JAIL—City, c/o O. E. Carr, central police station, jail. $250,000. D. L. Lewis, City Hall, engr.

BIDS ASKED

Mass., Norfolk—PRISON COLONY—June 16, by Dpt. Correction, S. Bates, State House, Boston, brick, steel cell dormitories at prison. $175,000. McLaughlin & Burr, 88 Tremont St., Boston, archts. Noted May 14.

N. J., Jersey City—HALL of RECORDS—Bd. Freeholders Hudson Co., Court House, bids about July 15, 16 story, basement, 200 x 225 ft., brick, steel, rein.-con., adjoining court house. $2,000,000. J. T. Rowland, 30 Veterans Sq., archt. Noted May 7.

N. J., Bradley Beach—MUNICIPAL—Bd. City Council, 701 Main St., bids about July 15, general contract altering and constructing 2 story, basement, brick, steel addition, Main St. and LaReine Ave. $150,000. K. M. Towner, Kinmouth Bldg., Asbury Park, archt. Noted Apr. 9.

R. I., Providence—COURT HOUSE—June 30, by State County Court House Com., W. B. Greenough, 30 South Main St., 8 story, brick, stone addition, College and Bennett Sts. $2,000,000. Jackson, Robertson & Adams, 1216 Turks Head Bldg., archts. Noted Apr. 23.

Tenn., Huntington — COURT HOUSE — June 16, by D. D. Maddox, secy. Carroll Co., Court House, 2 story, basement, rein.-con., limestone, brick, incl. auditorium, kitchen, Public Square. $150,000. Hart, Freeland & Roberts, 1208 Independent Life Bldg., Nashville, archts. Noted May 21.

CONTRACTS AWARDED

Calif., Techachapi—ADMINISTRATION and COTTAGES—State Dpt. P. Wks., Sacramento, general contract 2 story, 20,500 sq.ft. floor space, concrete administration building, 2 story cottages, each 10,500 sq.ft. floor space, concrete, tile, to W. Rohlbacher, Santa Ana, for State Institution for Women. $124,850. Noted Apr. 2.

Ind., Hammond—LIBRARIES—City Council, 3 brick, steel library buildings, to H. B. Olney, East Chicago. Est. $150,000.

Kan., Independence—COURT HOUSE—Clerk Montgomery Co., general contract 2 story, basement, 66 x 68 ft. addition, and remodeling court house, to F. D. Brewster, Independence, $92,998. Noted May 7.

UNCLASSIFIED

PROPOSED WORK

Ia., Davenport—MUSEUM—Davenport Public Museum, c/o O. E. Klingaman, 206 East Rusholme, dir., sketches probably concrete, stone museum. $500,000. **May not mature prior to 1936.**

N. Y., New York—BABY HEALTH CENTER—Dpt. Health, 505 Pearl St., bids in July 15, baby health center, 349 East 104th St. $150,000. K. M. Murchison, 101 Park Ave., archt. Noted May 7.

N. J., Jersey City—HOME—Hebrew Home for Aged, M. Hurwitz, 161 Summit Ave., 2 story, basement, 40 x 100 ft., brick, steel, Fowler and Van Nostrand Aves. $150,000. Project in abeyance. Bids in. M. Kraut, 3010 Hudson Blvd., archt. Noted May 7.

N. Y., New York—HOME—Hebrew Children's Home, 20 West 120th St., home, 205th St. and Grand Concourse. $500,000. **Maturity in winter or spring.** Bloch & Hess, 18 East 41st St., archts.

N. Y., New York—HOME—Presbytery of New York, will not build home for aged women. $1,000,000. Project abandoned. Noted Mar. 27, 1930.

N. Y., New York — HOME — Volunteers of America, 34 West 28th St., 15 story home, $2,000,000. Project in abeyance until December or later. J. Mertin, 34 West 28th St., archt. Noted Jan. 8.

N. Y., Verplanck—HOME—New York Urban League, 202 West 136th St., plans by F. K. Wells & A. C. Holden, 232 Madison Ave., New York, altering and constructing convalescent home addition and recreation center. To exceed $150,000. Noted June 4.

N. Y., New York—RESTAURANT—J. C. Westerveld, archt., 36 West 34th St., bids after June 15, general contract restaurant, Kitchen storage, 136 William St., for Childs Co., 200 5th Ave. $150,000. Noted Jan. 8.

CONTRACTS AWARDED

Calif., San Francisco—HOME—Old Ladies' Home of University Mound, c/o Coffey & Rist, archts., Phelan Bldg., part 1 and 2 story, rein.-con., to J. E. Scully, Phelan Bldg., $175,000. Noted Mar. 26.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Ark., Stuttgart—RICE MILL and ELEVATOR—P. Daniels, R. Roach, G. A. Myers, et al., Stuttgart, financing 300,000 bu. rice mill and elevator. $75,000.

Calif., Burbank — FACTORY — Coopers, 750 South Los Angeles St., plans by W. P. Neil Co. Ltd., 4814 Loma Vista, Los Angeles, (1st unit) 2 story, basement, 90 x 200 ft., Front St. and Verguda Ave. To exceed $40,000. Noted May 14.

Calif., Concord—POULTRY PLANT—Wickham-Havens, Inc., 1510 Frank St., Oakland (1st unit), timber, corrugated iron poultry buildings. $75,000. Total est. $350,000. Project in abeyance. Noted May 7.

Conn., Greenwich—ELECTROTYPING BUILDING—Conde Nast Pub. Co., Post Rd., soon lets contract 1 story, 60 x 140 ft. concrete electrotyping building. $40,000. W. Higginson, 101 Park Ave., New York, archt.

Conn., Waterbury—PLANT—Lux Clock Mfg. Co., 97 Sperry St., plans by T. Freney, 51 Leavenworth St., brick, steel manufacturing plant addition. To exceed $40,000. Noted June 4.

N. J., Jersey City—CHEMICAL PLANT—Clifton Chemical Co., Inc., 246 Front St., New York, 2 story, basement, brick, steel, 64-68 Essex St. $40,000. **Maturity about December.** Architect not selected. Noted Apr. 16.

N. J., Newark—WOODWORKING FACTORY—W. Snyder, archt., 790 Broad St., 3 story, 50 x 100 ft., brick, steel, New York Ave., for J. C. Kohaut, Inc., 117 Green St. Est. $40,000. Bids in. Project in abeyance. Noted May 7.

N. Y., Bolivar—OIL REFINERY—Allegany Refineries, Inc., c/o W. E. Sawyer, oil refinery. $200,000.

N. Y., New York — LAUNDRY — Cashman Laundry Corp., S. Cashman, pres., 369 East 149th St., plans by R. G. and W. M. Contg. Co., 50 Church St., 3 story, 95 x 267 ft. laundry, Gerard Ave. and 140th St. $180,000.

Okla., Picher — LEAD and ZINC MILL — Eagle-Picher Lead Co. preliminary plans new concentration mill. $400,000. Private plans. C. A. Smith, supt.

Pa., Uniontown—NEWSPAPER PLANT—H. W. Altman, archt., Fayette Title & Trust Bldg., bids in July, revised plans 2 story, basement, 24 x 100 ft. brick, hollow tile, limestone, for Daily News Standard, C. R. Lewellyn, pres., Pittsburgh and Peter Sts. Noted June 4.

Factories and Mills (Continued)

Tex., Fredericksburg—ASBESTOS MILL—G. W. Land, c/o University of Chicago, Chicago, Ill., and H. Noll and R. L. Schmerbeck, Kerrville, secured mineral rights of 3,000 acre tract and plan establishment of mill.

Tex., Hawley — OIL REFINERY — E. W. Moutray, Abilene, 1,000 bbl. d.c. oil refinery. $80,000. Private plans.

Man., Bowman Lake—PLANING MILL, etc.—T. A. Burrows Lumber Co., rebuilding planing mill, engine house and kiln, recently destroyed by fire. $300,000.

Man., Daulphin—PLANT—Daulphin Milling Co., P. Harrison, plant. $125,000.

Man., Winnipeg—CONCENTRATING PLANT—R. H. Webb, mayor, concentrating plant for manganese ores. $250,000.

N. B., Woodstock — WOOLEN MILL — S. Fisher, brick and steel mill, incl. equipment. $90,000.

N. B., Woodstock—SAW MILL, etc.—Haydens Ltd., saw mill and wood working plant, incl. equipment. $100,000.

Que., Montreal—FACTORY—Canada Carriage Body Co. Ltd., St. Hubert St., plans by F. W. Warren, 408 Federal Bldg., Hamilton, Ont., 1 story, 36 x 75 ft., brick addition, concrete found.

BIDS ASKED

Ia., Sioux City — COOLING PLANT — Swift Packing Co., U. S. Yards, Packers and Exchange Aves., Chicago, Ill., c/o G. Gale, local mgr., 3100 Valley Dr., taking bids 2 story, basement, 62 x 102 ft., rein.-con., brick addition, plain found., Leech St. $85,000. Private plans.

N. J., East Rutherford—FACTORY—J. T. Camlet, archt., 26 Piaget Ave., Clifton, bids about July 15, general contract 2 story, basement, 38 x 70 ft., brick, steel, plain found., Mozart St., for East Rutherford Syringe Co., 75 Mozart St. $40,000. Noted May 28.

N. J., Bound Brook—FACTORY—J. N. Pierson & Son, archts., 198 Jefferson St., Perth Amboy, bids about Aug. 1, general contract 1 story, basement, brick, steel, for Pathe Exchange, Inc., Middlesex Boro. $40,000. Noted June 4.

N. J., Linden—FACTORY—Atlantic Romper Co. Inc., 50 Atlantic Ave., Elizabeth, taking bids 1 story, basement, brick, steel. $40,000. W. Clifford, 470 Jefferson St., Elizabeth, archt.

N. J., New Brunswick—CLOTHING FACTORY—H. G. Bach, archt., 63 Schureman St., bids about July 15, general contract 3 story, basement, brick, steel, rein.-con. addition, Remsen Ave. for Aplo Clothing Co., Remsen Ave. $125,000.

Pa., State College—DAIRY and CREAMERY—June 15, by C. Z. Klauder, archt., 1429 Walnut St., Phila., 2 story, 50 x 140 ft., and 60 x 100 ft., brick, steel, plain found., for Pennsylvania State College, R. B. Hetzel, pres.

CONTRACTS AWARDED

Mass., Everett—PLANT—Merrimac Chemical Co., Chemical Lane, 2 story, 80 x 100 ft., brick, concrete bi-sulphite plant, plain found., to J. F. Griffin Co., 250 Stuart St., Boston. Est. $50,000. Noted May 28.

Mass., Greenfield—ARTIFICIAL ICE PLANT—Greenfield Ice & Trucking Co., R. C. Phelps, 56 Union St., plant, to T. J. Gass Co., 124 High St. Noted May 21.

O., Cleveland — FACTORY — Addressograph-Multigraph Corp., J. E. Rodgers, pres., East 40th St. and Perkins Ave., 1 story, 580 x 620 ft. factory, 3 story, 148 x 160 ft. office, 1 story, 64 x 68 ft. boiler house, all brick, steel, 1 battery of two 325 hp. tube boilers, 2 feed water regulators, 2 boiler feed pumps, governors ash and coal conveyor, to H. K. Ferguson Co., Hanna Bldg. Est. $1,000,000. Noted May 28.

O., Dayton — MANUFACTURING — Brown-Brockmeyer Co., Inc., Norwood Ave., 1 story, basement, 90 x 500 ft., brick, rein.-con., steel, plain found., to Henry Stock & Son, 55 Brandt St., $100,000. Noted June 12, 1930.

R. I., Providence—MILL—Paragon Worsted Co., A. Milot, Westminster St., 3 story, brick addition, plain found., to E. Turgeon, 36 Exchange Pl. Est. $40,000.

S. C., Greenville — TAPESTRY WEAVING MILL—Brooks Bros. Co., 4841 Lancaster Ave., Phila., tapestry weaving mill, to Gallivan Lumber Co., Greenville. Est. exceeds $40,000, incl. equipment.

Tex., Rio Grande City—PLANT—Rio Grande Pub. Serv. Co., c/o F. A. Hornaday, 709 Maverick Bldg., San Antonio and Rio Grande City, 1 story small gas plant, and 20¼ mi. 8 in. pipe line from field to city and distributing lines within city limits, own forces; machinery, to Joseph Greenspoon & Sons Steel & Iron Co., 3130 North Hall St., St. Louis, Mo., to Linde Air Products, 442 Cassiano St., San Antonio, to Metric Metal, Erie, Pa., to Westcott & Greis, Inc., Magnolia Bldg., Dallas. Est. $110,000. Private plans.

W. Va., Newell — FACTORY — Edwin M. Knowles China Co., 1 story, brick, steel, to Potters Lumber Co., East Liverpool, $100,000; 300 ft. glost tunnel kiln, to Harrop Co., 310 West Broad St., Columbus, O., $100,000.

Wis., Milwaukee—FACTORY—Chain Belt Co., 736 Park St., 1 story, basement, 90 x 106 ft., brick, rein.-con., steel addition, to Klug & Smith, 111 East Wisconsin St.; steel, to Worden-Allen Co., Port Washington Rd.

Ont., Toronto—WOOLEN MILL—Patons & Baldwin Ltd., 888 Dupont St., general contract 80 x 368 ft. main building, 68 x 80 ft. power house, and 80 x 180 ft. dye house, all 2 story, rein.-con. to Wilde & Brydo, Canadian Pacific Ry. Bldg. Est. $200,000. Noted Jan. 22.

GARAGES

PROPOSED WORK

N. J., Hackensack—Bergen Auto Co., E. W. Steffens, pres., 17 Banta Pl., plans by A. E. Dore, 173 Main St., 2 story, basement, 100 x 1.240 ft., brick, steel, rein.-con., auto sales and service building, Main St. and Hackensack Ave. $150,000. Noted June 4.

N. Y., New York—N. Lilardo, 18 Woodycrest Ave., White Plains, sketches by M. W. Del Gaudio, 545 5th Ave., 100 x 107 ft. service garage, Van Nest Ave. and 178th St. $40,000.

N. Y., New York — Two Hundred Twenty West 61st Street Corp., L. Irish, pres., 60 West 42nd St., plans by C. Schaefer, Jr., 332 East 149th St., 1 story, 100 x 1,250 ft. service garage, 218 West 61st St. $70,000.

N. Y., New York — Two Thousand Fifteen Daly Avenue Corp., M. Savio, pres., 1708 Lexington Ave., sketches by A. Lombardi, 1221 Sheridan Ave., 2 story, 100 x 115 ft. service garage, River Ave. and McClellan St. $100,000.

N. Y., New York—W. W. Westervelt, 194 Godwin Ave., Ridgewood, N. J., plans by LeR. P. Ward, 252 West 87th St., altering and constructing 3 story, 100 x 125 ft. top addition to service garage, 252 West 87th St. $45,000.

BIDS ASKED

Ia., Cedar Falls—See "Power Plants."

Mo., Sikeston—June 15, by State Hy. Comn., Jefferson City, concrete, brick garage, division office. T. H. Cutler, Jefferson City, ch. engr.

CONTRACTS AWARDED

Ind., Indianapolis—Lincoln Refining Co., 121 East Maryland St., general contract brick, steel super service station, to A. V. Stackhouse, 2611 Cornell Ave. Est. $40,000.

Mo., Kansas City—Missouri State Hy. Comn., Jefferson City, 2 story, basement, 66 x 98 ft. garage, 2 story, basement, 42 x 52 ft. office, brick, rein.-con., 31st and Quincy Sts., to M. E. Gillioz, Monett, $72,000.

N. Y., New York—C. Ciampi Realty & Building Co., 2095 Ryer Ave., 2 story, basement, brick, steel service garage, Morris Park Ave. and Wyatt St., day labor and separate contracts, $50,000. **Maturity in fall.** M. Siegel, 1775 Bway., archt. Noted May 21.

Pa., Erie—Erie County Electric Co., 12th and French Sts., 2 story, 28 x 35 ft. sub-station, Peach and Cherry Sts., to H. Platt Co., 1006-8 Palace Hardware Bldg. Est. $40,000.

Utah, Salt Lake City — Morrison Bros., 905 South State St., general contract 131 x 143 ft. garage, to J. E. Anderon, Salt Lake City. $30,000.

SHOPS AND FOUNDRIES

PROPOSED WORK

Wyo., Cheyenne — ROUND HOUSE — Union Pacific R.R. Co., H. C. Mann, ch. engr., 1410 Dodge St., Omaha, Neb., sketches roundhouse. $200,000.

BIDS ASKED

Que., Lachine — FOUNDRY — Jenkins Bros. Ltd., 617 Remi St., Montreal, taking bids iron, bronze foundry, main buildings, $300,000. Ross & McDonald, Architect's Bldg., Montreal, archts.

CONTRACTS AWARDED

N. J., Long Branch—SHOP—Atlantic Plumbing Supply Co., Long Beach Ave., general contract 1 story, basement, brick, steel, to J. Perrino, Long Branch Ave. Est. $40,000.

POWER PLANTS

PROPOSED WORK

Ill., Chicago — Swift & Co., Union Stock Yards, brick boiler room, 42nd St. east of Justine St. $75,000. Private plans.

La., Natchitoches—See "Waterworks."

Miss., Waynesboro—City, c/o Mayor, sketches concrete brick light and power plant. $69,500.

N. J., Elizabeth—Elizabethtown Consolidated Gas Co., 16 West Jersey St., 1 story, basement, brick, steel power plant, boiler room, 3rd Ave. and Erie St. $40,000. **Maturity probably soon.** Private plans.

BIDS ASKED

Ia., Cedar Falls—June 15, by State Bd. Educ., Des Moines, general contract concrete, rein.-con., brick, steel power plant, heating plant, shops, garage for Iowa State Teachers College, $365,000. E. E. Cole, Dpt. Building Constr., State Teachers College, archt. B. P. Fleming, Las Cruces, N. M., engr.

Kan., Dodge City—Kansas Power Co., c/o H. S. Kilby, genl. mgr. Operating Dpt., Salina, bids about June 15, 2 story, basement, 50 x 125 ft., concrete, brick, steel power plant, Ft. Dodge Rd., also general feeder water heaters, air heaters. Sargent & Lundry, Inc., 20 North Wacker Dr., Chicago, Ill., engrs.

Mo., St. Louis—June 30, by Bd. P. Serv., City Hall, one 400 kw. direct current and one 200 kw. alternating current direct connected steam engine driven generators, at Sanitarium Power House of St. Louis Water Works. $35,000. Private plans.

CONTRACTS AWARDED

Ind., Newcastle — Bd. Comrs. Village of Epileptics, State of Indiana, general contract brick, steel power plant, to A. R. Hunnicut, Newcastle; piping, to Callon Bros., 24 South Alabama St., Indianapolis. Est. $40,000.

Ia., Cedar Rapids—Iowa Railway & Light Corp., 2 story, basement, concrete, brick power plant, to Theo. Stark Constr. Co., 118 South 11th St. W. Est. $40,000.

Mass., Springfield—United Electric Light Co., 73 State St., brick, steel, concrete sub-station, East Springfield, separate contracts; found., to Adams & Ruxton Constr. Co., 1387 Main St. To exceed $40,000. Noted Apr. 4.

Utah, Logan—City Comrs., 1,125 hp. diesel engine and 875 kw. generator and switchboard, to Busch & Sulzer Bros. Diesel Engine Co., 3300 South, 2nd St., St. Louis, Mo., $63,350. Est. $65,000. Noted Apr. 16.

WAREHOUSES

PROPOSED WORK

Mass., Boston—Owner, c/o W. H. Ballard & Co., 45 Milk St., plans by Mowll & Rand, 21 School St., reconstructing 5 story, basement, brick storage and stores building, plain found., 165 Milk St., $100,000.

Mass., Palmer — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, store house at State Hospital, $75,000. Architect not selected.

Mass., Worcester — Northeastern Storage & Distributing Corp., J. Gerety, 93 Grafton St., plans by Howe & Lescaze, 337 East 42nd St., New York, 180 x 640 ft., brick, steel, concrete storage warehouse terminal, Grafton and Keefe Sts. $900,000. Noted June 4.

N. J., Bayonne — Bush Terminal, I. T. Bush, pres., Bush Terminal, Brooklyn, N. Y., and A. Simons, in charge, 100 Broad St., New York, rein.-con. Greenville to Constable Hook. To exceed $1,000,000.

N. Y., New York—Alva Realty Corp., I. H. Washburn, vice-pres., 1508 3rd Ave., plans by DeYoung & Moscowitz & Rosenberg, 205 East 42nd St., 5 story, 25 x 100 ft. storage showroom, manufacturing loft, 3rd Ave. and 152nd St. $80,000.

N. Y., New York—W. E. Diller Constr. Co., 912 Grand Concourse, plans by E. F. Sibbert, 114 5th Ave., 2 story, 100 x 100 ft. storage, stockroom, etc. Morris Ave. and 164th St. To exceed $55,000. S. H. Kress & Co., 114 5th Ave., lessee.

N. Y., New York—J. H. Hertz, 236 West 70th St., plans by L. Rothman, 125 West 45th St., 100 x 100 ft. storage and industrial or light manufacturing plant, Randall Ave. and Manida St. $40,000.

N. Y., New York—Lincoln Warehouse Corp., 1187 3rd Ave., bids in August, warehouse, bank, office, 201 East 64th St. $500,000. G. S. Kingsley, 103 East 125th St., archt. Noted Apr. 9.

N. Y., New York—E. W. Wade, 1 Liberty St., will not build 14 story, basement, 100 x 123 ft. furniture storage, 303 East 30th St. $500,000. Project abandoned. G. S. Kingsley, 103 East 125th St., archt. Noted Jan. 22.

O., Cleveland—Bd. Comrs. Cuyahoga Co. F. J. Husak, clk., plans by P. L. Koklauner, Court House, 2 story, basement, 100 x 180 ft., brick, rein.-con., storage and garage, Fitzwater Rd. $150,000.

T. H., Honolulu—Honolulu Constr. & Draying Co., Honolulu, plans by C. W. Dickey, 405 S. M. Damon Bldg., Honolulu, warehouse. $200,000.

BIDS ASKED

O., Cincinnati—June 15, by Cleveland Union Terminal Co., Temple Bar Bldg., Cleveland, 2 story, 70 x 740 ft., brick, steel, concrete express building. $500,000. H. M. Waite, Temple Bar Bldg., Cleveland, engr.

Tex., Waco—See "Contracts Awarded."

B. C., Vancouver — Barber-Ellis Ltd., 1206 Homer St., bids about June 22, 4 story, basement, 75 x 120 ft., rein.-con. warehouse, plain found., Homer St. $75,000. Townley & Matheson, 435 Homer St., archts.

CONTRACTS AWARDED

Calif., Los Angeles—Braun Corp., 363 New High St., 2 story, 85 x 395 ft., concrete, brick warehouse, East 12th St. and Imperial Ave., to Stanton-Reed Co., 816 West 5th St., $90,000.

Ill., East St. Louis—Illinois Central R.R. Co., 135 East 11th Pl., Chicago, Ill., general contract rebuilding freight depot and office, incl. 1 story section, 32 x 270 ft. and 2 story section, 32 x 487 ft., face brick, rein.-con. on old found., recently damaged by fire, to Ellington Miller Co., 25 East Jackson Blvd., Chicago; plumbing, to E. J. Maag, 335 North 5th St. Est. $180,000. Noted May 21.

N. J., Wanaque—North Jersey Dist. Water Supply Comn., 24 Commerce St., Newark, general contract 1 story, basement, 20 ft. high, store house, traveling crane, paving at Wanaque Headworks, to H. A. Evertz, 248 North 9th St., Newark. Est. $40,000. Noted May 28.

Tex., Waco — Nash Robinson & Co., 1600 Franklin Ave., reconstructing 70 x 350 ft. warehouse, and 40 x 650 ft. sheds, frame and iron sides and roofing, yellow pine or maple flooring, 28 gal. galvanized iron, local labor. Private plans.

See proposal advertising on page 92

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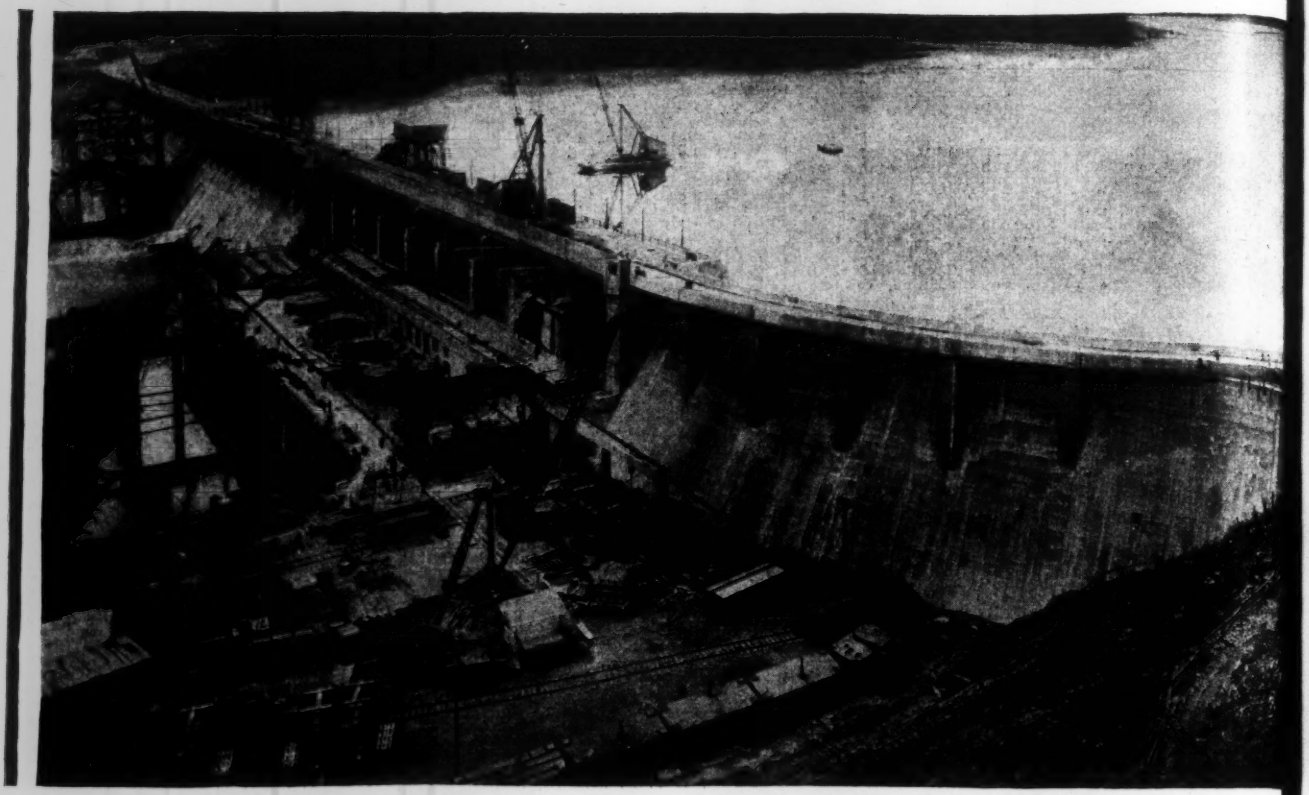
OSAGE DAM



WATER is backing up in the Missouri "Ozarks" behind the new dam in the $32,000,000 Osage Power Project on the Osage River near Bagnell, Mo.

For 129 miles it will back up, forming a lake 95 square miles in area, with a shore line of 1300 miles, with an available storage, based on a 30-ft. draw down, of 52 billion cubic feet, and with an energy storage of 80 million kilowatt-hours.

Built for the Union Electric Light and Power Company by Stone & Webster Engineering Corporation, the dam is 2543 feet long and 148 feet high. Contract was signed Aug. 5, 1929; the last sluiceway was closed Feb. 19, 1931. Concreting progress ran as high as 113,000 cu. yd. per month.

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